

Local Contributions to Global Sustainable Development Agenda:

Case Studies in Integrated Coastal Management
in the East Asian Seas Region

Chua Thia-Eng • Chou Loke Ming • Gil Jacinto • Stephen Adrian Ross • Danilo Bonga
EDITORS



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Foreword

Congratulations to PEMSEA on its 25th Anniversary and launch of this publication, “Local Contributions to Global Sustainable Development Agenda: Case Studies in Integrated Coastal Management in the East Asian Seas Region”. This publication is particularly timely as we approach the first milestone year for several SDG 14 targets – 2020, for 14.2, 14.4, 14.5 and 14.6 – just two years away.

Perhaps nowhere else on Earth are ocean and coastal resources more important to economies, livelihoods, poverty reduction, and reduction of inequalities than in East Asia, where as much as 20% of some countries’ GDP is derived from ocean and coastal activities, and millions depend on healthy oceans for their livelihoods and food security. This linkage in turn underscores the critical importance of SDG 14, and closely linked SDGs such as SDGs 6, 8, 12, and 13, to achieving the overall 2030 agenda in East Asia.

Since 1993, PEMSEA has been on the front lines of demonstrating and scaling up local (municipal, provincial) scale approaches to sustainable ocean and coastal use, through its application, testing, and continued refinement of integrated coastal management (ICM). In parallel, it has created a robust regional governance framework for the Seas of East Asia, through the multi-stakeholder development and implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA). SDS-SEA integrates both existing and new commitments to sustainable ocean use, and provides an institutional, oversight, and monitoring framework for SDS-SEA through creation of the East Asian Seas Partnership Council, the triennial East Asian Seas Congress and Ministerial Forum, and the PEMSEA Network of Local Governments, with PEMSEA serving as its Secretariat.

UNDP’s new Strategic Plan (2018-2021) defines its vision as “To help countries eradicate poverty in all its forms, accelerate structural transformations for sustainable development, and build resilience to crises and shocks”. To deliver on this vision, the Plan describes a set of signature solutions, including *strengthen effective, accountable and inclusive governance* and *promote nature-based solutions for a sustainable planet*. PEMSEA’s ongoing work, supported in part by UNDP, directly supports this vision and these signature solutions.

Few projects in the GEF International Waters portfolio have been more transformational than PEMSEA by bringing ICM to nearly 19% of East Asian coastlines from a baseline near zero in the early 1990s. The 47 case studies detailed in this volume provide a wealth of valuable information and experience in the application of ICM, from the role of governance to stakeholder engagement, to monitoring and reporting. UNDP invites other regions and countries to review and learn from the PEMSEA approach and experience towards its replication and further upscaling. PEMSEA, through its continued commitment to assisting East Asian countries to apply and scale up ICM, can play a major role in helping East Asia to realize the 2030 agenda.

Andrew Hudson
Head, Water and Ocean Governance Programme (WOGP)
Sustainable Development Cluster
Bureau for Policy and Programme Support (BPPS)
United Nations Development Programme (UNDP)

Foreword

2018 is the 25th Anniversary of PEMSEA. What better way to celebrate this momentous occasion than with the release of this tome: *Local Contributions to Global Sustainable Agenda: Case Studies in Integrated Coastal Management in the East Asian Seas Region*.

The case studies (herein) provide over two decades of integrative and collaborative coastal governance as demonstrated in the region. The examples provide working modalities under an ICM system of governance and management framework that contribute to ecological resiliency and biodiversity protection, political and administrative transformation, smarter economies, and social vulnerability safety nets. This is an amalgam of perspectives showing the integration of science, culture, and political economies through tractable processes, partnerships, and demonstrable changes. Indeed, the ICM system has been tested and verified: enough reason for PEMSEA to claim that this functional mechanism can contribute to sustainable development.

However, the region (and PEMSEA) cannot rest on its laurels, as they say. Alarm bells have been sounded off once again.

We are drowning in plastic. The ocean is suffocating, and this is not an ordinary problem in marine pollution: it is massive; it is complex; and it is wicked. The visible, great patch of floating debris in the gyre commands indignation. Underneath it (and across seas), millions upon millions of micro beads and fibers are starting to infect our food chain; what appeared to be an isolated concern before, huge swathes of abandoned fishing gears are actually threatening our ocean resources and biodiversity; plastic enveloping our mangroves, seagrass beds, and coastal bays signify our wanton throw-away consumption lifestyle. The plastic problem is wicked and a menace because it is not only about visible, single-use plastic. It represents production and consumption going awry; problems in food security, biodiversity, and livelihood can be a direct causality; and it possibly could drive climate challenges further south.

It is best to take heed of, and remember, what John Muir (1838-1914), said before: “When we try to pick out anything by itself, we find it hitched to everything else in the universe.”

Against this backdrop, East Asia is once again challenged: five of the top ten contributors to the global plastic problem are located in our region. Indeed it is a wicked stain, but the Asian culture is very optimistic: the “challenge : opportunity” dichotomy card can always be pulled out as a rallying siren.

We are pleased that this PEMSEA’s 25th Anniversary Publication came out at this time. It is one of the hopeful reminders, that as a region, we can.

The coastal and ocean problems impinging on our region's capacity towards attaining the goals of sustainable development may have been differently framed and appreciated back then. However, as we can learn from the UN's crafting of the Millennium Development Goals (MDGs) and now the Sustainable Development Goals (SDGs), these challenges have remained complex and wicked because of the multiplicity of issues (and actors) that are inherently linked and embedded in larger sociopolitical, cultural, and economic contexts. As this publication reiterated: the challenges required...“a major shift in system processes (and perceptions), which are integrative and collaborative in gambit and in the form of a partnership arrangement in ambit (Chua and Bonga).” This tenet has become truer in today's reality.

This publication asks us to remain steadfast to the core values of integrated coastal governance:

- **Fidelity to local contexts and priorities.** The ICM system required: “...local commitment and action because a local government's involvement is essential to the successful implementation of the central government's [and international agenda's] policies, strategies, and plans [and prescriptions] on economic development and environmental management. A local government directly interacts with its constituents and coastal communities on a daily basis and thus engages local knowledge and influences local interactions (Chua and Bonga).” The mantras: “all politics are local”; “all disasters are local”; “all (economic) developments are local” ring true: while economic development and for that matter, disasters, have global ramifications, they first and foremost affect a specific, unique culture, environment, and locality.
- **Scale down to scale up.** Local actions are the flywheels: When enough traction is created through growth in local capacity and successes, it generates the equivalent push and power to influence policy reforms towards scaling up. This tenet underpins the essential contributions of local capacity development: “The ICM system helps to develop technical and leadership competencies in local practitioners so that they become effective agents of change (Visal, et al.).” Capacity is developed through repeated interactions, through building relationship and trust, and through strengthening partnerships. To scale up is very necessary because a local government with a functional ICM system, but is surrounded by problematic localities, is in itself vulnerable to environmental, political, and economic threats and disruptions. In addition, the goals of the fundamental principles of ecosystem-based management, integration, and adaptive management; and the targets of biodiversity conservation, climate change adaptation, disaster risk reduction, and poverty alleviation remain vacuous when interventions (and perceptions and mindsets) of governments are not allowed to scale up and flourish.
- **Bridge policy agenda with political agenda.** Coastal and ocean policies in integrative and collaborative governance are only as effective as their implementation. The anathema of the many previous coastal management polices was that local governments and managers were “stuck in a planning loop” conundrum, which resulted in tremendous increase in the number of policy reforms and directions whereas many of these policies remained unimplemented on the ground. Also, while the science of

ecosystem-based management, resilience, and adaptive management is sufficiently adequate, it has to be welded and integrated to the day-to-day political economy. The ICM system is valuable because it provides the platforms for “...the legitimacy which the public local administration confers; the credibility which the science-based learning by doing approaches exhort; and the enhanced partnership which a strong public constituency and an informed public coalition offer (Bonga and Chua).”

Stay the course, we must. But it behooves everyone to continuously leapfrog to a smarter economy and cleaner seas because we can.

We invite you once again to partake of the wealth of wisdom, knowledge, and experience in this publication.

Lastly, congratulations to all the local governments of PEMSEA participating countries for pioneering the application of the ICM approach and the authors for putting together this landmark publication.

Antonio La Viña
Chair, East Asian Seas Partnership Council,
PEMSEA

Aimee Gonzales
Executive Director,
PEMSEA Resource Facility

Preface

This document “Local Contributions to Global Sustainable Development Agenda: Case Studies in Integrated Coastal Management in the East Asian Seas Region” is released as a special publication to commemorate the 25th Anniversary of the Partnerships in Environmental Management of the Seas of East Asia (PEMSEA). It marks the conclusion of more than two decades of continuous regional efforts in developing, testing and verifying approaches, tools, and operational methodologies of integrated coastal management (ICM) that were applied unilaterally or in combination in addressing most of the critical governance and management concerns of the coastal area and its adjacent river basins and marine areas in 12 East Asian countries. ICM as a comprehensive working model enables the participating countries and partners to achieve the goals of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA) following its adoption by the 2003 Putrajaya Declaration.

The East Asian Seas region, comprising Brunei Darussalam, Cambodia, PR China, DPR Korea, Indonesia, Japan, Lao PDR, Malaysia, Philippines, RO Korea, Singapore, Thailand, Timor-Leste and Viet Nam and home to more than 2.1 billion people, is a hub of demographic and economic activities with annual gross domestic product growth rates as among the fastest in the world. The region is one of the most diverse areas in the world in terms of culture, religion, economic status, topography, and environment. It also encompasses a chain of large marine ecosystems (LMEs), subregional seas, coastal areas, and associated river basins that harbor complex biotic communities like fishes, shellfish, seaweeds, seagrasses, corals, and mangroves and as spawning and nursery grounds for many marine and catadromous species. Apart from biotic importance, the seas of the East Asian region are linked to large-scale atmospheric, oceanic, and biological processes/phenomena, influencing climate, primary productivity, and ocean circulation, including highly migratory species.

The rapid economic development and political restructuring in the region after the Second World War, although at uneven pace of economic growth, saw a significant decline in poverty rates. However, large portions of the populations remain economically vulnerable to economic downturns, natural calamities, and political instability. With the high growth of populations coupled with economic development, the region has been subjected to increasing pressure attributed to environmental conflict and the sustainability of resources brought about by overexploitation of natural resources, overfishing, landuse conflicts, pollution from land and sea-based sources, habitat destruction, severe weather events, and many other challenges.

Scientific and technological advances have revealed a picture of the state of environment at the global level, showing the extent of global resources exploitation and destruction, pollution, and other impacts of human activities. Clearly, the need for environmental management, particularly in the coastal areas where the confluence of human settlements and economic activities has the greatest interactions and impacts, is imperative. The exponential growth of human settlements and economic development in coastal areas aligned with flourishing global maritime trades and shipping activities have posed serious governance and management challenges for peaceful and sustainable use of the coasts, seas, and oceans.

The publication of Rachel Carson's *Silent Spring* in 1962 marked the beginning of environmental movement, particularly in America and ten years on, the publication of the report "Limits to Growth", which was commissioned by the Club of Rome, promoted the concept of sustainable development. In the same year, the first World Summit on Human Environment was held in Stockholm. In 1983, the Brundtland Commission was formed independent of the United Nations and focused on environmental and developmental problems and solutions. It was dissolved in December 1987 following the publication of its report "Our Common Future", also known as the "Brundtland Report" in October 1987. Two years later, sustainable development was officially discussed at the World Conference on Environment and Development (WCED). This was followed by the UN Conference on Environment and Development (UNCED) in 1992 in Rio de Janeiro with the adoption of Agenda 21. In 2000, the UN Millennium Summit held in New York adopted the Millennium Development Goals (MDGs). Ten years after the first Rio Summit, the World's Summit on Sustainable Development (WSSD) was held in Johannesburg to evaluate the progress of Agenda 21, followed by the adoption of the Plans of Implementation. With increasing recognition of and commitments to sustainable development, another UNCED was held in 2012 at Rio de Janeiro (Rio +20) and a follow up document on sustainable development was adopted: "The Future We Want". However, it was not until 2015 that the world body finally adopted the 17 goals and 169 associated targets for sustainable development with a defined timeframe (2015 - 2030), i.e., the Sustainable Development Goals (SDGs) where SDG 14 is devoted entirely to seas and oceans.

On another front, the UN Convention on the Law of the Sea (UNCLOS, 1973-1982) was finally adopted in 1982 and entered into force in 1994, providing the international guidance and a framework in the peaceful utilization of the world's seas and oceans. Several other international conventions, protocols, and codes under the auspices of the UNEP, FAO, and IMO were adopted and also entered into force aimed at regulating human activities on biodiversity and maritime trade, pollution, shipping, fisheries, and the protection of the marine environment.

For over four decades since 1972 to the adoption of SDGs in 2015, sustainable development, which remains the common vision of the international communities, gradually filtered into national policies of many countries, particularly those that are parties to international conventions and protocols. Managing the coasts and the adjacent seas and river basins to achieve the goals of sustainable development poses practical challenges to carry out considering that horizontal governance and sectoral management were unable to effectively address multiple use conflicts, differing sectors' interests, legislative and institutional inadequacies, and weak management capacity. The 1960s marked the initiation of area-based coastal management efforts by the United States as exemplified by the San Francisco Bay Management, in 1965 and the initiation of coastal zone management initiatives at the subnational level. Their success led to the enactment of the US Coastal Management Act of 1972, a landmark legislation to manage the interactions of coastal land and seas. Subsequently, several national and regional initiatives focusing on various coastal management approaches were initiated leading to a plethora of terms such as CRM, ICM, ICZM, CAM, ICAM, EBM, ICOM and IWRM, which were largely driven by donors and scientists. While each coastal management initiative made good contributions to knowledge and experiences, a common and reliable operational approach/methodology that can be adopted and applied to manage the coastal areas towards achieving sustainable development goals was yet to be realized.

In 1993, the GEF/UNDP/IMO Marine Pollution Prevention and Management for the Seas of East Asia (MPP-EAS) Project was implemented to address marine pollution problems in Large Marine Ecosystems in the East Asian Seas region. Apart from marine pollution associated with international shipping, one of the project components was to develop a working modality for ICM. Its implementability as a working modality was tested at local level through the establishment of ICM demonstration sites. The Batangas Bay area in the Philippines and the City of Xiamen in PR China served as ICM demonstration sites with the Project's objectives to develop and implement their ICM programs. Such programs would be based on a common sustainable development framework where the planning and implementation processes were built upon past USAID-sponsored projects on ICZM and CRM initiated in the 1980s in Southeast Asia. The second phase (1997-2007) of the GEF-sponsored project saw the number of ICM demonstration sites increased to ten in eight countries (Cambodia, PR China, DPR Korea, Malaysia, Philippines, Indonesia, Thailand, and Viet Nam). Under this second phase, the region project focused on, among others, the following:

- i) consolidating and upscaling ICM initiatives by establishing ICM parallel sites and scaling up ICM practices;
- ii) building coastal management capacity at local, national, and regional level; and
- iii) developing the regional strategy, "Sustainable Development Strategy for the Seas of East Asia" (SDS-SEA).

The implementation of the SDS-SEA marked the third phase (2007-2017) of the GEF-sponsored project and the continuity of upscaling practices throughout the region. During this period, the ICM framework and operating modality evolved into an ICM system that would lead to the attainment of the SDGs, especially SDG 14 as well as the goals and targets of other marine-related international environment conventions and protocols.

The ICM system has proven to be effective because of its dynamism in:

- challenging the conventional horizontal governance approach by forging stronger interagency and multisector cooperation and investment through vision-led, area-based sustainable development planning;
- building political and social acceptance and accountability for holistic, integrative, and longer term management approach;
- challenging conventional disciplinary approach in developing information base for sector or resource-based management by engaging in interdisciplinary and multisectoral research to provide management-based information and scientific and technical support;

- challenging traditional capacity development approach by promoting institutional capacity and specialized skills at the local level through “learning by doing” and involvement of local-based research and education institutions in ICM practices; and
- challenging prevalent dependency on a regular government budget by leveraging private sector investment or co-investment in environmental improvement projects.

The effectiveness of the ICM system arises from the comprehensive development and refinement of its six key components - governance framework, sustainable development aspects, ICM cycle, stakeholders’ participation, monitoring and reporting, and certification of the code of practice – which were verified in 47 case studies presented in this book.

This publication presents the information, knowledge and experiences garnered and gained over 25 years of ICM implementation in the East Asian Seas region, which are largely considered as ‘grey literature and grey information’ and not readily available to the general public and seldom considered in peer-reviewed journals. Written by those who have actually implemented the ICM programs in their respective sites or have been closely associated with it throughout the many phases of implementation, the uniqueness of the 47 case studies lies not in the problems and issues being addressed for these are relatively similar in many regional seas but on the integrative and adaptive interventions made in the context of local and/or regional state of affairs. These interventions are by no means prescriptive and should be seen as guidance on best practices in developmental works for the management and protection of the coastal and marine areas.

The contributions referred to in this publication highlight the challenging ICM approach, which has been proven to be a viable, operating modality that could pave the way to achieve SDGs, particularly in other regional seas. Thus, with the scaling up and replication of ICM practices along the national and regional coastlines, the global sustainable development agenda could be realized.

The Editors

Acknowledgments

This publication would not have been possible without the enthusiastic support of the contributing authors. Some are from ICM coordinating committees of local government units, some from the PEMSEA office, while others are local champions of coastal protection or academics actively involved with coastal management. The diversity of their experience in meeting the challenges of ICM implementation and operationalization, especially from their individual perspective adds great value to the ICM lessons learned over the last twenty-five years. The contributors represent a broad spectrum of expertise and management level. How each participated in ICM system development within the different political, environmental and socioeconomic context of local situations is documented and synthesized in this book.

We are indebted to the national governments of member countries, the non-country partners of PEMSEA and the numerous local governments for adopting, initiating and supporting ICM and sustaining its operation, which resulted in the increasing replication of the ICM system throughout the region. This facilitated the full involvement and participation of many relevant stakeholders including local communities, NGOs, business entities, private sector, educational and research institutions.

Our deep gratitude goes to Partnership in Environmental Management for the Seas East Asia (PEMSEA) and Coastal Management Center (CMC) for their strong joint support towards the publication of this book. PEMSEA's Executive Directors, Raphael Lotilla and Stephen Adrian Ross, who succeeded Chua Thia-Eng persisted in driving the ICM vision and ensured continuity in the region's ICM effort. The Editors are appreciative of the support from PEMSEA's technical staff who worked the ground with local governments and for willingly sharing their valuable and unique experiences in ICM practice.

This book contains an analysis and synthesis of lessons related to ICM development and implementation and how challenges were addressed in different sites and the demanding and time-consuming work of the copyediting team (Anna Rita Cano, Marie Sol Sadorra) is recognized. We particularly thank our long-time colleague, James Paw, for voluntarily agreeing to assist with further editorial work and refining the final drafts of this book to its completion. Our appreciation is also extended to Michael Villanueva for managing the indexing, and to Jonel Dulay and John Christian Castillo for handling the layout and design of the book.

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The Editors

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Introduction

Introduction

Local Contributions to Global Sustainable Agenda: Case Studies in Integrated Coastal Management in the East Asian Seas Region – the 25th Anniversary publication of Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) – highlights the sustainable coastal development efforts of PEMSEA partners over the past quarter century. The multi-sector, interdisciplinary approach applied in the design and implementation of integrated coastal management (ICM) programs in East Asia has generated a wealth of knowledge and experiences in policy and functional integration that cut across coastal use sectors, disciplines, levels of government, and stakeholders, as well as spatial and temporal scales. This publication, which includes 47 case studies written by managers, practitioners, scientists, and various other government and nongovernment participants, is a unique collection of ICM good practices and lessons learned from the perspectives of both users and beneficiaries.

Over the years, PEMSEA's pursuit to operationalize ICM in the region has aligned with the objectives and targets of international agenda, particularly those related to biological diversity, land and sea-based pollution and waste management, climate change, natural and manmade disasters, water management, fisheries, and food security. As progress and innovations developed globally to address existing and emerging challenges to sustainable development, PEMSEA's thrust was to translate high-level concepts into on-the-ground practices that were attuned to issues on the international agenda but manifested at the local level.

As a consequence, ICM gained political and social acceptance across the region by providing participatory platforms to strengthen interagency, inter-sector cooperation; strengthening policy-science integration to ensure effectiveness and efficiency of management interventions;

building local institutional and individual management capacities for addressing governance and management complexities in coastal and marine areas; and creating innovative financing mechanisms for long-term investments.

In 2012, a call to secure renewed political commitment for sustainable development was expressed in the Rio + 20 document, “The Future We Want”. Subsequently, in 2015, the Sustainable Development Goals were adopted by the United Nations, providing 17 goals and 169 targets to guide actions globally in key areas where government, private sector, and citizens alike are required to invest to transform economies and prosper within the social and ecological boundaries of the planet.

Consistent with these political commitments, the ICM system evolved throughout the East Asian Seas region. In many cases, ICM working models were well-ahead of concepts, mechanisms and methodologies being discussed in the international arena. Tractable outcomes were achieved through ICM system applications that supported approaches in ecosystem-based management, spatial planning, governance and public administration, systems science, and leadership development. From 1993 to 2017, PEMSEA established ICM sites in almost 60 locations in 12 countries, in collaboration with national and local governments, demonstrating the value of ICM with concomitant capacity building for program expansion and upscaling. By 2017, 19% of the region’s coastline was under ICM (Figure 1).

The ICM system continues to be upscaled both geographically and functionally in coastal areas and watersheds throughout the region. PEMSEA’s Country Partners adopted a target of 25% ICM coverage of the region’s coastline by 2021 for sustainable development and management of the region’s ocean and coastal resources. This target was confirmed as a voluntary commitment of PEMSEA’s Country Partners to SDG 14, Life Below Water, during the UN Ocean Conference in June 2017.

This three-part publication seeks to provide the reader with:

- A comprehensive discussion of the ICM system backed by case studies;
- A series of case studies written by local leaders, managers and practitioners, natural and social scientists, academicians, private sector, and partners from nongovernment organizations;
- Good practices and lessons learned to support replication and scaling up of ICM in the region; and
- An operational modality that other regions of the world can consider adopting and applying.

The case studies demonstrate that addressing sustainable development challenges at the local level does not solely depend on scientific and technological interventions. Many require a mix of innovative and strategic policy, legislation, education, financing, and capacity development, boosted by political will and strong leadership mechanisms to effect change. The case studies further show that successful ICM systems in the East Asian Seas region significantly improve institutional and individual capacities to lead, develop, and implement programs and action plans to attain local sustainable development priorities and objectives.

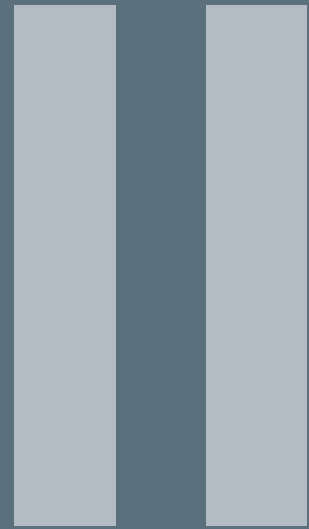
Overall, the case studies emphasize the critical and essential roles that sub-national/local governments can and need to play in the global agenda for sustainable development. Without local buy-in and action, it is evident that global targets, for the most part, will remain unattainable. The ICM governance and management systems described in this publication provided local governments and local stakeholders with the direction and means to work together, to identify acceptable solutions to overcome common challenges and potential threats to sustainable development, to influence and facilitate policy reforms, and to create an environment for efficient and effective public and private sector investment.

Figure 1. ICM replication and scaling up in the EAS region.



The operational challenge to scale up and sustain the ICM system remains a priority of PEMSEA and its partners, recognizing that ICM is a governance and management system that encompasses ecological complexities and environmental uncertainties, as well as new and emerging political

and social priorities of government and governance mechanisms. It is a constant reminder for leaders and managers to stay attuned to the issues and priorities at the national and local levels, and to continue embracing integrated management as a vehicle to sustainable development.



The ICM System: Development and Evolution

The ICM System: Development and Evolution

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Evolutionary trends in coastal management: A synopsis of conceptual development and practices

The ICM concept and practice evolved and matured as a comprehensive integrated management system in over 50 years worldwide. The thread of the narrative in recent years was usually a short report of its progress in each decade (Chua, 2006; Bille, 2007; Ye, et al., 2015). The intention of this section is to build on these short narratives and create a more comprehensive yet concise historical perspective on coastal management to set the stage on how the ICM system and its corresponding practice evolved. Another focus is on how ICM is related to current global goals pertaining to

sustainable development and environmental management. The objective is to be able to stress the importance of local initiatives in meeting global goals. The approaches, frameworks, mechanisms, processes (and their interactions) — the key elements of an ICM system — are certainly relevant and linked with the global sustainable development concept and contribute to achieving its objectives. The latter half of the discussion is about the growth of the ICM system in the seas of East Asia region.

The term “integrated coastal management (ICM)”¹ was conceptualized as a “coastal zone management” approach in the early 1960s, which was underpinned by strong scientific, multidisciplinary origins in the 1970s. It was consequently recognized as

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¹ ICM is used here synonymously with other terms such as *integrated coastal zone management (ICZM)*, *integrated coastal area management (ICAM)*, *integrated marine and coastal area management (IMCAM)*, *co-management*, and other integrated environmental or resource management approaches. (See Footnote 8, p. 13).

a viable practice in the 1980s (Underdal, 1980; Sorensen and McCreary 1984; Cicin-Sain and Knecht, 1985, 1998; Sorensen, 1993). The decade was also instrumental in promoting the concept of “sustainable development” and in coining “integrated coastal management” in anticipation of the Rio Summit. By the 1990s, ICM was politically accepted during the UNCED Earth Summit in Rio de Janeiro (Cicin-Sain and Knecht, 1998) and henceforth became internationally recognized in the 2000s as the framework of choice in implementing international conventions and agreements (FAO, 1995; Cicin-Sain, et al., 1997; Scialabba, 1998; Coccossis, et al., 1999; Salm, et al., 2000; Cicin-Sain and Belfiore, 2003; AIDEnvironment and RIKZ, 2004; Chua, 2006; Chua, 2013a, 2013b). As such, experts heralded ICM as an effective operational framework to achieving the long-term goals of sustainable coastal development (Tobey and Volk, 2002; Olsen, 2003; Chua, 2006). Post-Rio, with the proliferation of the ICM practice globally (Sorensen, 1993, 1997, 2002; Belfiore, 2003), the reporting of lessons learned — successes and failures — became the norm. This practice further contributed to the evolution of ICM and how ICM operations can be sustained (Christie, 2005; Christie, et al., 2005) and its practice, scaled up across regions (Chua, 2006, 2008a, 2008b, 2010).

Over each decade, the observation was that ICM and its practice became more scientifically sophisticated and robust (Bremer, 2011); more politically accepted in discourses in the international arena as a way to operationalize sustainable development (Vallega, 1997; Tobey and Volk, 2002; Stojanovic, et al., 2004); and more inclusive and collaborative as other local and traditional knowledge, norms, and values of different stakeholders coalesce with scientific inputs (Dovers, 2002; Jentoft, 2007; Jentoft and

Chuenpagdee, 2009). The undercurrent in each decade was the basic act of reframing or change in how humans view their relationship with coasts, oceans, and other ecosystems (and with other governments, societies, and communities) as more experiences and knowledge about their interactions unfold (Perlas, 2000; Chua, 2006).

Science-policy interface

The 1960s emphasized the growing recognition of the coastal area as unique, productive yet vulnerable, particularly to natural hazards and that it needs to be properly managed for coastal development; provided with measures to address multiple use conflicts and to protect and conserve the resources therein; and defended from disaster agents (Cicin-Sain and Knecht, 1998). Developed countries like the USA and Australia began their initiatives around this important understanding. In 1965, the USA started ICM efforts with the creation of the San Francisco Bay Conservation and Development Commission, while in 1966, Australia began theirs in Port Phillip Bay (Sorensen, 2002). In 1969, the US Stratton Commission published *Our Nation and the Sea* recommending a coordinated approach to coastal planning and decisionmaking and the use of science to inform decisions (Commission on Marine Science, Engineering and Resources, 1969). In 1972, the Coastal Zone Management Act was passed, based on the recommendations of the commission. Coastal states throughout the United States were encouraged to develop and implement coastal zone management plans financed by federal funding as an incentive.

As reviewed by Bremer (2011), ICM originated from and was influenced by multiple disciplines over the decades². The early ICM practice heavily borrowed and mirrored the tools, methods,

² *The various disciplines by themselves were also in the process of maturing at that time. By the same token, because of the early stage of knowledge, ICM was “compelled” to take a pragmatic strategy to move the practice forward: the by now, oft-repeated learning-by-doing strategy. In a science-based, hypothesis-testing framework, Bremer (2011) calls ICM an “empirical exercise in learning-by-doing.”*

and experiences coming from various disciplines: planning, environmental management, resource economics, public administration, geography, etc. (Cicin-Sain and Knecht, 1998). Thus, ICM proffered a mechanism where decisions about coastal resource use, allocation, protection, and development — made within a political/administrative economy — were informed and strengthened by science: a science-policy integration (Cicin-Sain and Knecht, 1998; Chua, 1997).

By the 1970s, when the coastal area was increasingly being viewed as complex and the ecosystems therein interconnected, the need for a multidisciplinary approach was further advocated. By this decade, there was a significant call for coastal management and development that must be balanced with environmental protection. The concept of “sustainable development” emerged with the publication of “Limits to Growth” commissioned by the Club of Rome (Meadows, et al., 1972).

New knowledge about ecosystem responses in areas experiencing very rapid growth in population and economic progress had started to cause concerns. Foremost of these concerns was the increase in reports about deteriorated, polluted coastal environments, and the overexploitation and overharvesting of coastal resources. It was also reckoned that some of the negative ecosystem responses to such reconfiguration manifested only years, even decades later, and in some cases the consequences were felt far from the originating problematic area. A long-term view (and spatial interconnections) to coastal management was beginning to be realized. Strong influences from ecology and systems science emerged that spawned new approaches as well (Bremer, 2011) — such as adaptive management (Holling, 1995), incrementalism (Lindblom, 1979), ecosystem-based management (Forst, 2009), and marine protected areas (Clark, 1998) — and contributed further in the maturity of ICM and the other disciplines upon which it was grounded.

By the 1980s, precautionary approach, carrying capacity, and resilience served as additional guiding principles to an increasingly-becoming prominent sustainable development concept to coastal management practice and to the growing concern about climate change. However, a preponderance of experiences was coming mostly from developed countries. Thus, beginning in the early 1980s, development agencies, like the US Agency for International Development (USAID), promoted the US model in many developing countries in Latin America, East Africa, and Southeast Asia (Scura, et al., 1992; Sorensen, 1993; Tobey and Volk, 2002; Olsen, 2003; Chua, 2008a, 2010).

While the earlier ICM practice was limited to a few coastal uses and conflicts, there emerged three transitions to framing the coastal issues with the proliferation of ICM practices in an even wider scope of coastal issues: in governments, the integration of comprehensive, cross-sectoral, and inherently linked coastal issues have become an impetus to strengthening interorganizational integration and coordination (Scura, et al., 1992; Cicin-Sain and Knecht, 1998; Chua, 2006; Bremer 2011); in science, the transitioning from using multidisciplinary to interdisciplinary approach (Vallega, 1997), i.e., the creation of new ways of making sense and framing of issues as a result of interactions among different disciplines; and in the science-policy interface, the strategy has become that of complementing applied natural and social science and government-centric processes, with other sources of knowledge (such as local and traditional) and values. Social suasion and aspirations were increasingly being incorporated within policies (Folke, et al., 2005). As a result, top-down to bottom-up mechanisms brought to fore approaches like consensus building (Innes, 1999), collaborative management (Godschalk and Mills, 1966; Gray, 1989; Healey 1992; Wondolleck and Yaffee, 2000; Margerum and Whitall, 2004), co-management (Pomeroy, et al., 2001; Jentoft, 2007), community-based collaborations (Pomeroy, 1995; Christie and White, 1997; Raymundo, 2002),

and partnerships (Williams and Ellefson, 1997; Wondolleck and Yaffee, 2000; Sabatier, et al., 2005; Lowry and Chua, 2008).

The international political response to the transitions in knowledge was through the Brundtland Report, Our Common Future (WCED, 1987), as it marked a paradigm shift to sustainable development — an overarching end goal: marrying economic, ecological, and social targets — which was further endorsed by the World Commission on Environment and Development in 1989. With the increasing experiences in ICM being shared³, coupled with guarded optimism⁴, the norm of using the term “coastal zone management” has transitioned to using “integrated coastal management” by this time, in anticipation of the Earth Summit in Rio.

Political acceptance

The UNCED Earth Summit and Agenda 21 in 1992 may well be the watershed that marked the point when ICM became politically accepted and proliferated, globally⁵. At the summit, a political declaration (and commitment) was called: for all coastal nations to have a national ICM programme in place by the year 2000 (Olsen, et al., n.d.)⁶. Following the summit, practical ICM guidelines were published: Clark (1992, 1996), OECD (1993), Pernetta and Elder (1993), World Bank (1993), Bower, et al. (1994), MAP/UNEP-PAP/RAC (1995), UNEP (1995a, 1995b), GESAMP (1996), Post and Lundin (1996), UNEP-CEP (1996), Barousseau, et al. (1997),

Lemay (1998), Olsen, et al., (1997), CEC (1999), Henocque and Denis (2001), and Hewawasam (2002).

In 1993, the World Coast Conference developed the Noordwijk Guidelines for Integrated Coastal Zone Management (World Bank, 1993). In 1994, GESAMP further defined ICM, particularly how science is incorporated in the ICM process. GESAMP (1996) advocated a five-step ICM cycle, a precursor of the succeeding ICM cycles that were developed and advocated. In 1996, the first international conference assessing successes and failures of ICM in tropical developing countries was held in Xiamen, PR China. Among its outputs were the lessons learned and guidelines to implementing ICM (Chua, 1996b).

These guidelines further provided the frameworks and mental models or visual representations, which constituted an ICM system in parallel with an earlier articulation of the whats, whys, and hows of integrated marine policy (Underdal, 1980). The ICM practice has always been recognized and described as a management system — comprising the interlocking elements of an ICM policy including its planning, implementation and monitoring and evaluation processes (Ehler and Basta, 1993; Chua, 1996a; Chua, et al., 1997) — and has been alternately defined before as a resource management system (Scura, et al., 1992; Chua, 1993) and a coastal area management system (Hufschmidt, 1986; Chua, 1993), underpinning the influences contributed by ecology and systems science.

³ In 1978, the First US Coastal Zone Conference was held in San Francisco. Fourteen conferences were further held. The first conference on coastal resources management was convened in Mar de Plata, Argentina, in 1984.

⁴ ICM demonstration sites have been referred to before as “expensive dead-ends” (Hale and Olsen, 2003), which was particularly true in the 1980s when most of the existing ICM management plans had not yet been implemented.

⁵ The 1993 roster of about 217 ICM initiatives (Sorensen, 1993) had grown to almost 700 initiatives in the mid-2000s—a tripling of the efforts being undertaken in only around 9 years (Sorensen, 2002; Belfiore, 2003).

⁶ In 2001, at the Paris Conference on Oceans and Coasts, experts further agreed that 20% of the national coastlines worldwide be placed under an integrated management regime over the next 10 years (IOC/Center for Study of Marine Policy, 2002). It was also recommended to extend to 60% in 20 years and 100% in 30 years.

The 2000s saw the adoption of ICM as framework of choice for implementing conventions and agreements, including: climate change (IPCC); Jakarta Mandate on Marine and Coastal Biodiversity under the Convention on Biological Diversity (CBD); the UN Food and Agriculture Organization's Code of Conduct for Responsible Fisheries; and land-based pollution (UNEP). In May 2002, the European Union formalized the adoption of the principles of ICZM (2002/413/EC) by its member countries (European Commission, 2002).

Over time, the near “fever-pitch” welcoming responses to ICM eventually became criticisms, as various realities came to fore:

- On the one hand, with various prescriptions coming out of the various guidelines, so did different implementation models⁷ supported by international fund donors, the UN and scientific and research institutions, which on the other hand, gave way to a plethora of terms used to describe ICM initiatives, depending on the approach and understanding of the implementing groups; and encompassing various geographical or functional scales⁸.
- The ICM practice from developed countries spread to developing nations through donor funding. The funding to implement ICM increased tremendously; yet across developing regions, the activities stopped
- once the short-term funding lapsed (Pomeroy and Carlos, 1997; Olsen, 2002; White and Salamanca, 2002; Christie, 2005; Chua, 2008a; Bonga and Chua, this volume). As a number of governments were unwilling to move ahead when external support dwindled, the concern was raised about sustaining the ICM initiatives.
- In developed countries, particularly in the European Union which influenced the rapid growth of ICM practice in Europe, while capped with an official recommendation in 2002 in the implementation of ICM (2002/413/EC) and the adoption of ICZM: A Strategy for Europe (COM/2000/547), this was also a period of arguing against and a declining interest in ICZM. Experts argued that “the availability of priming funds from EU and emphasis on ‘pilot’ and ‘demonstration’ methods...[that were inconsistent and fragmented across the region]... have tended to encourage a project-based approach to ICZM that failed to realize long-term objectives...[and thus its quality and effectiveness suffered because of what was referred to then as the ‘tyranny of small decisions’]” (Shipman and Stojanovic, 2007).
- The incremental increase in the body of knowledge cannot be denied as “successful” and failed experiences had continued to be presented in international conferences,

⁷ As enumerated by *Taljaard, et al. (2011)*, other ICM frameworks and implementation models have also been tried, including: cross-sectoral integrated coastal area planning (CICAP) process (*Pernetta and Elder, 1993*); Olsen's ICM cycle (*Olsen, et al., 1997, 1999*); the model proposed by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP, 1996); the World Bank guidelines (*Post and Lundin, 1996*); the ICM guidelines by *Cicin-Sain and Knecht (1998)*; the European ICZM recommendations (*European Commission, 2002*); the Canadian integrated management model (*DFQ, 2002*), the Australian implementation model (*NRMMC, 2006*); and the flexible cyclical umbrella model proposed by the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) (*UNEP/GPA, 2006*).

⁸ These various terms, include: CRM (coastal resource management); ICRM (integrated coastal resource management); ICZM (integrated coastal zone management); CAM (coastal area management); ICAM (integrated coastal area management); CB-CRM (community-based coastal resource management); CR-CM (coastal resources co-management); integrated coastal and ocean management (ICOM); integrated river basin management (IRBM); integrated water resource management (IWRM) (*Clark, 1996; Haq, et al., 1997; Chua, 2004, 2006*).

and documented⁹. Soon a practice-based assessment became the norm, which resulted in, on the one hand, recognizing the overwhelming place-based, nuanced, contextual differences to ICM implementation — from which the fundamental tenet “fidelity to context” was key to grounding the initiatives at the local level. On the other hand, such assessment provided a diffused evaluation of what constitutes a successful ICM. [Stojanovic, et al. \(2004\)](#) noted: “Often, accounts of practice in coastal management will be followed abruptly by conclusions about what is successful with little explanation, as to how the conclusions were reached or why this is so.” The rhetoric about a comprehensive programme was met with arguments against attributing successful outcomes solely to ICM ([Bille, 2007, 2008](#)); questions were raised as to the ability of ICM to operationalize “integration” ([Underdal, 1980; Miles, 1991; Anker, et al., 2004; Shipman and Stojanovic, 2007; Portman, et al., 2012](#)); and an internationally recognized standard ICM practice or a framework was lacking, or what other experts noted: “no international or generic blueprint that can be applied routinely to yield predictable and desirable outcomes” ([Taljaard, et al., 2013](#)).

In addition to the value of gaining “strength in numbers” with the increasing ICM initiatives being implemented, studies have shifted — and hence, towards the improvement of the ICM practice — into looking closely at evaluating integrated coastal management more holistically and as a wholly functional management system ([Chua, 1998, 2006, 2008a](#)): the time of discovery of what elements and parts constitute an ICM system has ended and thus began the evaluation of “the relationships, processes, and interactions that connect [these

elements]” ([Buanes and Jentoft, 2009; Jentoft and Chuenpagdee, 2009](#)).

In 2000, the UN released the Millennium Development Goals (MDGs) as time-bound targets for sustainable development. This served as cue to further advance ICM practice: to build upon good practices and parlay new mechanisms to contribute in meeting the targets. ICM additionally had been linked to ecological economics ([Costanza, et al., 1997; Costanza, 1999; Costanza, et al., 1999](#)), putting importance in the valuation of ecosystem goods and services, which further help inform policy questions in tradeoffs, like: ‘How are finite resources to be allocated?’, ‘Who bears the costs and reaps the benefits of interventions and policy reforms?’ To further strengthen the systems theory as applied to institutions and organizations, mechanisms to create adaptive, “learning organizations” ([Senge, 1990](#)) received further boost. Also, development economy studies pertaining to poverty and livelihood generation ([Glavovic, 2006](#)) gained prominence which can be linked to an earlier tenet on “public participation and consensus building, within the institutional dimension, as critical mechanisms for the early stages of the ICM process” ([Cicin-Sain and Knecht, 1998](#)). These and other mechanisms were highlighted to respond to the MDGs’ primary call: alleviate poverty and end hunger.

Social and cultural acceptance

In 2002, ten years after Rio, the World Summit on Sustainable Development (WSSD) in Johannesburg has put ICM practice to further scrutiny as it recognized that there was little progress in establishing national ICM programs as the coasts continued to be degraded ([Tobey and Volk, 2002](#)). The avowed operationalization of the goals for

⁹ In 1993, the First MedCoast Conference was held; five others followed. The biennial Coastal Zone Canada started in 1994; in 1996, the first international conference assessing successes and failures in ICM was held in Xiamen, PR China ([Chua, 1996b](#)). In 2004, the first Asia-Pacific Conference was held in Brisbane, Australia; the second was held in Batam Island, Indonesia, in 2006.

integration — across coastal use sectors, disciplines, levels of government, stakeholders, and spatial and temporal scales — was also wanting.

To build from the significant fundamentals that have been established, and to make integration more central to the ICM practice, the take home message after the WSSD was to invest in stronger partnerships (among governments, civil society groups, and private sector) and to use the principles of ecosystem-based management to augment the ICM framework; the former, to strengthen the link between government and public integration; and the latter, to further enhance science–policy integration and spatial and temporal integration.

In governments, the use of buzzwords “coastal management” and “ICM” has transitioned to using “integrated coastal governance” instead, to mean a coastal governance that does not rest solely on government and politics, but to also emanate from other communities of stakeholders (Olsen, 2003; Chua, 2006). Aptly put, integrated coastal governance is an “interactive governance” (Kooiman, 2003) and is the “integration of people, science, politics, and values” (Dovers, 2002). Governance sets the framework within which management can proceed as it “establishes the fundamental goals, institutional process, and structures that are basis of planning and decisionmaking” (Best, 2003).

Mechanisms to scale up integrative and collaborative frameworks to explicitly augment ICM with ecosystem-based management resulted in a number of approaches: ridge to reef; white water to blue water; ICOM (integrated coastal and oceans management), EAFM (ecosystem approach to fisheries management), etc. Water issues regarding supply and availability became important as integrated water resource management (IWRM) became prominent.

As ICM initiatives were being scaled up across regions, strategies to complement coastal and marine planning with land use planning started to

emerge, a mechanism that further taught spatial, functional, and temporal interconnectivity. Spatial planning is increasingly being touted as a way to reduce or resolve use conflicts, maintain ecosystem health, help in food security, and reduce impacts of disaster.

The sentiment that prevailed was “safety in numbers”: a successful local ICM practice, alone and amid problematic areas, is in itself very weak and vulnerable. Good practices need to be replicated, and functional networks of robust and resilient ecosystems are recognized as providing the insurance of a continuous flow of ecosystem goods and services.

In 2012, renewed calls to further secure political commitment for sustainable development was ushered in what is known as the Rio +20 initiative with the release of the outcome document, *The Future We Want*. It was also geared towards looking beyond the MDGs that concluded in 2015 and towards the Sustainable Development Goals (SDGs). The SDGs provide 17 goals and 169 targets to guide actions globally in key areas where the government, the private sector, and citizens will have to invest to transform economies and prosper within the social and ecological boundaries.

Against this new political commitment and to contribute to the new targets, it is essential to take stock and reflect on where the ICM system stands right now. In 50 years, the maturity of the practice would have been an “ode to humility.” In government, the movement towards collaborative forms of governance — from management to governance — has been empowering other stakeholders. Governments cannot do it alone, they need management constituencies, public coalitions, and an informed public. In science, as it continues to inform ICM practice, the movement is from multidisciplinary to interdisciplinarity (Buanes and Jentoft, 2009; Christie, 2011) [and possibly to transdisciplinarity (Visser, 2004; Buanes and Jentoft, 2009)], from a strong science-centric science–policy interface towards gradually allowing the democratization of science (Bremer, 2011).

There has been humility to include and assimilate other sources of information and knowledge. We could be seeing a new transdiscipline, possibly, a new governance/management science or a new sustainability science, breaking down many disciplinary barriers that require investing in a “new breed” of coastal leaders (NRC, 2008; Bonga, et al., 2014). Thus, in human capacity development, as there is so much to learn, the significant role of champions, enabled leaders, and practitioners cannot be over-emphasized. Their continuous learning and improvement are necessary elements. Coastal leaders of today are expected to be knowledgeable of numerous disciplines as well as to be enablers, facilitators, communicators, and policy brokers and policy entrepreneurs (Bonga, et al., 2014; Chua, 2015). To become effective — simultaneously with the maturity of ICM toward integrative, collaborative governance amid problems of sustainability, complexity, and uncertainty — ICM leaders are challenged to intuitively integrate knowledge, skills, and values that will enable productive engagement with a governance system and an interdisciplinary team (Drath, 2003; NRC, 2008; Beinecke, 2009; Boiral, et al., 2009; Doppelt, 2010; Olsen, et al., 2010; Bonga, et al., 2014).

The ICM system in East Asia and the role of PEMSEA

The concept and practice of coastal management were introduced to the East Asian region in the early 1970s, to address mostly fisheries management and marine pollution from land-based activities. Full-scale ICM programs, however, were launched beginning mid-1980s through a number of regional projects funded by donors and multilateral agencies. Most projects then were largely driven by donor support (Chua, 2006). Exploratory efforts in Thailand and the Philippines in the mid-1970s expanded to Brunei Darussalam,

Indonesia, Malaysia, and Singapore in the 1980s (Chua, 1989; Scura, et al., 1992). By the 1990s, several other countries, including Cambodia, PR China, DPR Korea, RO Korea, and Viet Nam, had also replicated various forms of ICM.

Multilateral financial institutions, such as the Asian Development Bank and the World Bank, also contributed to the expansion of ICM efforts in the region and other parts of the world (ADB, 2003; Krishnamurthy, et al., 2009).

The evolution of ICM in the region is very unique and it cannot be discounted that the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)¹⁰ played a very important, catalytic role, and for some good measure, even offered and demonstrated effective working models that were well ahead of mechanisms being discussed in the international arena (PEMSEA, 2007, 2011b, 2012, 2015).

Over two decades, the pursuit by PEMSEA to operationalize ICM in the region had always been aligned with the prescriptions from international agendas, in parallel with the progress made in concept and practice, globally, and attuned to the problems in the implementation of ICM, as they manifested, as previously described. While the conceptual options in starting ICM in the region came from coastal experts from western countries and funding came from western developed countries, the initiatives in the region, as implemented through PEMSEA, took a different path.

As prescribed by international agendas, ICM in the region has been nested in different levels of governance hierarchy to become relevant and be implemented — the usual continuum it followed involved: advocated and communicated regionally, committed to subregionally and nationally, and

¹⁰ PEMSEA is an offshoot of the GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas (MPP-EAS) which ran in 1994-1999.

implemented locally. To advocate ICM in the region, PEMSEA acts as a regional mechanism in active collaboration and partnerships with its country and non-country partners: a Partnership Model (Bernad, et al., 2006; Kullenberg, et al., 2006; Chua, et al., 2008a; Chua, 2013a). This was a different track from that taken by most other regions, which opted to undertake legally binding conventions and agreements through the UNEP Regional Seas Programme (Kullenberg, et al., 2006; Chua, et al., 2008). The collaborative networks or partnerships established by PEMSEA at the local, subregional, and regional levels brought about consensus among country and non-country partners in crafting and implementing the region's Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)¹¹. The region's SDS-SEA had been contributing to meeting the MDGs (PEMSEA, 2007, 2011b, 2012, 2015). With the recent adoption of SDGs in 2015, the SDS-SEA had been reframed to provide HOPE: Healthy Oceans, People and Economies (Chua, 2016; PEMSEA, 2016).

While UNCED prescribed national-driven ICM implementation initiatives, East Asia undertook initiatives that were both national and local government-driven. It has since learned the primacy of developing ICM that is enabled at the national level, but more importantly, one that has to be implemented on the ground: developed and modeled given different governance systems and capacities.

Local commitment and action

In the mid-1990s, effective working models on ICM were demonstrated in Batangas Bay (Philippines) and Xiamen (PR China) with the objective of utilizing the ICM framework and process to address

marine pollution problems arising from land-sea interactions (Chua, et al., 1999). Building on the successful completion of the demonstration projects and realizing the need to take a broader, integrative partnership management approach to address complex management concerns, six additional ICM programs were established in Bali (Indonesia), Chonburi (Thailand), Da Nang (Viet Nam), Nampho (DPR Korea), Port Klang (Malaysia), and Sihanoukville (Cambodia). All six ICM programs were led and owned by local governments. From 1993 to 2014, PEMSEA established ICM sites in 26 locations, demonstrating the value of ICM and building capacity for expansion to other locations. Building on the experience gained at these sites, PEMSEA's partner countries began expanding to 31 additional sites around the region, in collaboration with local governments. By 2017, about 19% of the region's coastlines were under ICM (see Figure 1 in Introduction; Table 1).

PEMSEA required local commitment and action because a local government's involvement is essential to the successful implementation of the central government's policies, strategies, and plans on economic development and environmental management. A local government directly interacts with its constituents and coastal communities on a daily basis and thus engages local knowledge and influences local interactions. This is governance that is "exercised in proximity to the problem, by involving those who know" (Jentoft and Chuenpagdee, 2009), and is in the best position to develop tailor-made solutions. As articulated in the cases throughout this volume, the interventions were decided through multisector engagement and cooperation in response to local issues and concerns within

¹¹ PEMSEA was transformed from a project-based arrangement to a regional collaborative mechanism through a regional policy instrument, the 2006 Haikou Partnership Agreement. This regional mechanism established an East Asian Seas Partnership Council: a complex, formal network of representatives of the signatory nations to the Haikou Partnership Agreement on the Implementation of SDS-SEA (Chua, et al., 2008a; Lowry and Chua, 2008).

Table 1. Geographic scaling up of ICM in 2017 and opportunities for scaling up to 2021.

Country (Length of total national coastline)	Length of coastline covered in 2015	Percentage of national coastline covered by existing ICM programs/sites in 2015	Length of coastline covered in 2017	Estimated percentage of national coastline covered by new ICM programs/sites in 2017	Opportunities for ICM scaling up to cover 25% of the regional coastline by 2021
Cambodia (440 km)	119.00	27.0	321.00	73.00	
China (32,000 km)	3,488.05	10.80	749.70	2.34	Development of an ICM certification standard in line with PEMSEA's ICM Code and Recognition System as a voluntary mechanism for the 52 coastal cities and provinces to subscribe to ensuring sustainable development of coastal areas and implementation of good governance practices in managing these areas. Issuance of a State Oceanic Administration (SOA) Administrative Guidelines is anticipated to facilitate the process.
DPR Korea (2,880 km)	127.00	4.41			
Indonesia (95,161 km)	7,494.00	7.88	4,300.76	4.52	National Act on Management of Coastal Zones and Small Islands requires the development of ICM programs in all coastal provinces of Indonesia.
Japan (35,000 km)	492.50	1.41			Basic Act on Ocean Policy and Basic Plan on Ocean Policy 2013 requires the integrated management of land and sea and establishing a coordination system for ICM to be led mainly by local governments. Possible scaling up sites: - Taketomi Town, Okinawa Prefecture, consisting of 16 islands - Omura Bay Area, Nagasaki Prefecture, includes 5 cities and 5 towns
Malaysia (5,087.5 km)	291.00	5.72			Potential scaling up in Kedah State following the example in Selangor State; Kedah Water Resources Authority has identified Langkawi Island, with 55 km coastline, as the first ICM site
Philippines (36,289 km)	6,421.86	17.70	918.25	2.53	ICM status review of the 228 (out of 832) coastal municipalities with ICM plans, as reported by the Department of Environment and Natural Resources (DENR) in May 2015, will be conducted using the PEMSEA ICM Code. Advocacy for the passage of the ICM Bill in the 17th Congress; updating of the National ICM Program and adoption by DENR through a Department Administrative Order (DAO).
RO Korea (14,963 km)	14,963.00	100.00			
Singapore (195 km)	195.00	100.00			
Thailand (3,148 km)	171.80	5.46	391.05	12.42	Marine and Coastal Resources Management Promotion Act, B.E. 2558 (2015) requires all coastal provinces to establish interagency Provincial Committees on Marine and Coastal Resources and develop marine and coastal resources management plans
Timor-Leste (735 km)	142.00	19.30	112.16	15.26	Possible replication of ICM programs in other coastal districts
Viet Nam (3,269 km)	1,319.00	40.30	1,098.00	33.59	Law on Marine Resources and Environment of Seas and Islands ratified by the National Assembly and took effect on 1 July 2016; National ICM Strategy to 2020 and Vision to 2030 and National Action Plan 2016-2020 approved by the Prime Minister; ICM Policy and Technical Guidelines under development to support ICM implementation in 28 coastal provinces as required by the law and national ICM strategy
GRAND TOTAL 227,713.6 km	35,224.21	15.47	7,890.92	3.46	Target 4: 25% of the region's coastline

their jurisdiction that have national and global significance (i.e., climate change impacts, biodiversity protection, pollution reduction, fisheries management, etc.). PEMSEA's emphasis on local actions has helped build confidence on the application of ICM as an effective management tool that can be used to address governance challenges and resolve many management issues related to environmental sustainability (Chua, 2006; Chua, et al., 2006).

Sustained continual improvement

Xiamen and Batangas are PEMSEA's longest-operating ICM sites, which have been sustaining their ICM systems for nearly 24 years (Bermas and Chua, this volume; Bonga and Chua, this volume). The same goes with the other sites; they were able to continue sustained by their local government's development policies and implementation processes.

More than two decades of PEMSEA's ICM practice in the East Asian Seas region have generated significant practical knowledge and demonstration of best approaches and methodologies. With the need to adopt a holistic, integrative framework for the management of the coastal areas where a complex interplay of multiple use conflicts occur, ICM evolved over the years with its frameworks, platforms, processes, and mechanisms that have been refined into an ICM system. The ICM system has seen its growth from being known as a resource management system with its essential elements consisting of three mutually supporting dimensions of processes, issues, and actions (Scura, et al., 1992; Chua, 1993), to a system evaluated with respect to its concept, operation, and effectiveness (Chua, 1998), and finally to a system akin to an environmental management system that is comprehensive, systematic, planned, participatory, documented, and codified (Chua, 2008a, 2013a, 2015).

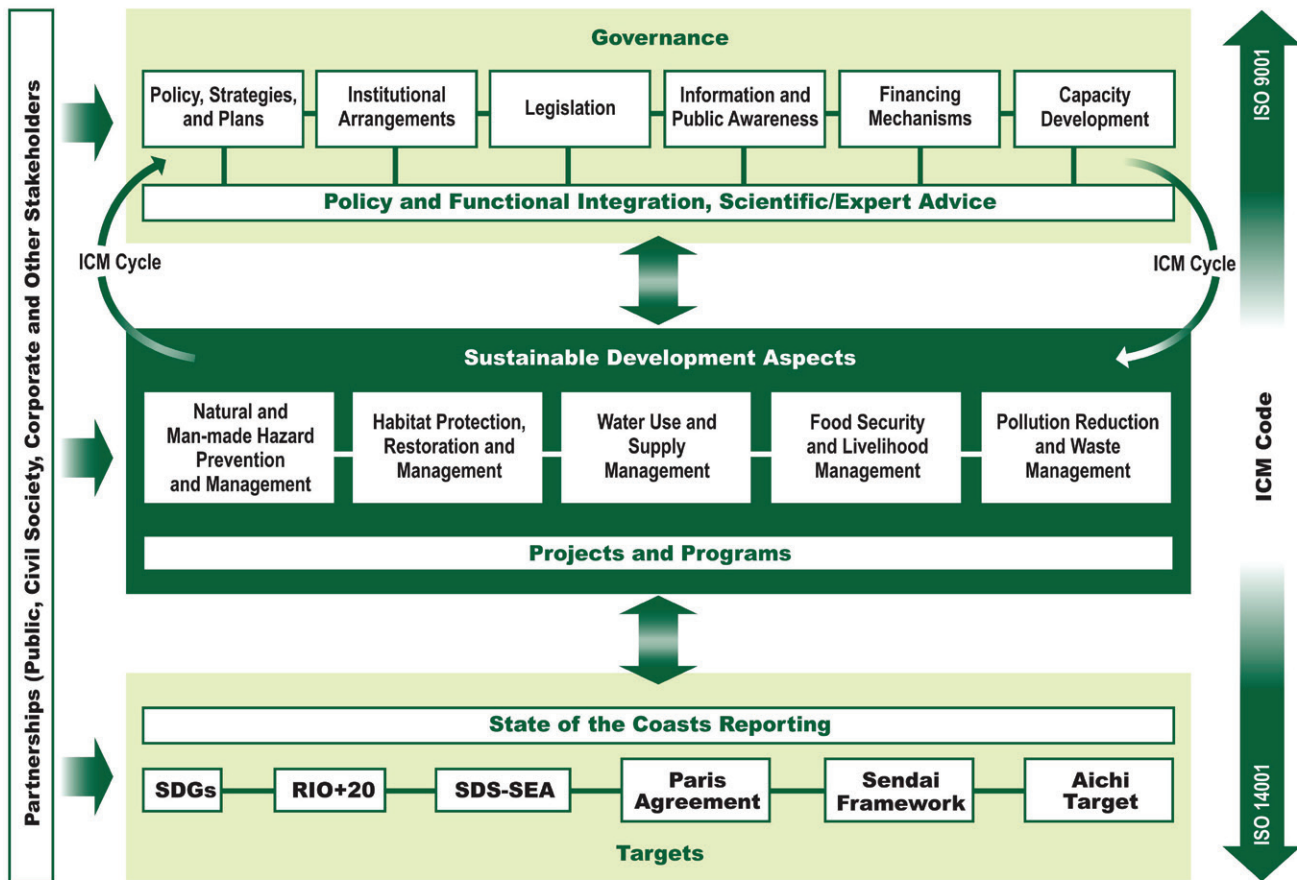
The ICM system as advocated by PEMSEA and why it is unique

PEMSEA has developed and implemented a comprehensive, integrative, ecosystem-based approach — the Framework for Sustainable Development of Coastal Areas (SDCA) — to provide as comprehensive a platform as possible by which to achieve the SDGs in coastal areas (see Figure 1). The SDCA Framework encapsulates the six principal components of the operational modality of the ICM system that contribute to sustainable ocean and coastal governance and management (Chua, 2008a) as well as local implementation of a number of international conventions related to biodiversity (XOFB, et al., 2012; Chua, 2016); land-based pollution (Chua, et al., 1999; Sudiarta, 2012); marine pollution and safety in navigation and shipping (Poopetch, 2012; Apai and Thammapredee, 2012); food security and livelihood (Padayao and Sollestre, 2009; Rafael, et al., 2010); and climate change and disaster risk reduction (Zhuang, et al., 2011; Dieu, et al. 2012).

Legitimacy and political acceptance

An ICM system provides a governance component (a framework umbrella) now used for addressing all development and environmental issues guided by the principles of sustainable development. The component emphasizes the integration of policy and strategies in developing actions, as well as creating a policy environment for environmental financing, stakeholder participation, including scientific and expert advice, and capacity development. It also promotes institutional arrangements that facilitate interagency and multisectoral cooperation and collaboration, develops appropriate legislation to ensure policy and functional integration across sectors, and provides a legal basis for their enforcement. It is a strategic attempt to streamline and fast-track government actions.

Figure 1. Process-oriented common framework for sustainable development of coastal areas through ICM implementation.



The platform for the legitimacy of ICM in the region came from the buy-in when local issues, threats, and priorities were contextualized through ICM tools (Coastal Strategy and its implementation plan, risk assessment, stakeholder analysis, etc.). A local, shared vision has been the most fundamental outcome of this platform (Lowry and Chua, 2008). Echoing most experts' view, a shared vision: "is a powerful image that can inspire change (Mahon, et al., 2005); fosters a "commitment to the long-term...[as] it brings direction, meaning and logic concerning the 'how[s]' and 'why[s]' of governance" (Senge, 1990); and legitimizes as it espouses the "governing practice, as well as the authority behind it" (Jentoft, 2007). The outcomes from public policy discussions have helped identify specific, contextualized priorities for investment, the

implementation of which was further legitimized by institutionalized arrangements, such as coordinating mechanisms, legislations, and coastal use zoning.

Targeted investment and technical-knowledge building

An ICM system addresses key development and environmental challenges to sustainable coastal development. The component on the sustainable development aspect is a call for action to create food security and sustainable livelihood; programs on habitat protection, restoration, and management; water use and supply management; pollution reduction and waste management; and natural and man-made hazard prevention and

management. The ICM system emphasizes the link that exists between coastal and ocean governance of coastal and marine activities, with the protection (or rehabilitation) and sustainable management of ecosystem goods and services, and their benefits and impacts to people. It allows identified key sustainable development challenges to be addressed holistically and across management areas.

The outcomes from this knowledge are the creation of program management silos (Taljaard, et al., 2013) and management constituency (Garces, 2015) that are geared towards a particular issue or sector and yet driven by the vision and objectives of an overall governance component. As Taljaard, et al. (2013) emphasized: “This implies that management programs, even though sector- or issue-based, remain nested in an ecosystem-based approach subservient to the agreed requirements and needs of the coastal ecosystem.” This helps develop local technical skills and make room for interagency coordination that involves joint/consultative planning with various agencies and stakeholders.

The component creates a policy environment and targeted investment opportunities for public and private sector financing. Ideally, a harmonious, peaceful co-existence between these mutually linked (but oftentimes competing) concerns, issues and sectors can be established. But pragmatically — and given the increasing trend in coastal urbanization, development of the ocean economy, and the pressure coming from climate variation and change — tradeoffs and priorities need to be determined and agreed upon; local governments have to choose which coastal activity in which area is the main concern and is in need of the financing and investment portfolios that can better achieve the goals of an ecosystem-based management approach and of sustainable development. Coastal use zoning and gradual scaling up are important tools that can augment decisionmaking.

Adaptive, science-based learning by doing

By utilizing the ICM cycle (Figure 2), an ICM system guides and steers the direction of ICM implementation at the local government level (Chua, 2008a; Bonga and Chua, this volume). Designed to be long-term and iterative, the ICM cycle is science-based learning by doing and underpins capacity development. It commences continual improvement as a result of concomitant increase in experience, knowledge, and capacity over time. Through “sequential attention” (Buanes and Jentoft, 2009), the competencies and confidence in local government are built, which not only increases credibility but also builds constituencies, an informed public and public coalition (Jentoft, 2007; Taljaard, et al., 2013; Bonga and Chua, this volume).

Accountability

An ICM system enables a systematic approach in monitoring coastal management progress and in evaluating performance indicators over time, tracking not only achievements but also investments of resources. PEMSEA developed an enhanced, continuous monitoring and evaluation mechanism built through the State of the Coasts (SOC) reporting system to keep tabs on how local government interventions are progressing, and more importantly, to identify gaps in the programs of action. SOC serves as a tool for assessing baseline conditions at a site (e.g., demographic, socioeconomic, ecological) and for measuring changes and determining trends over time. The SOC provides local chief executives with a report card on the effectiveness and impact of ICM programs, and gives direction for future actions (PEMSEA, 2011a; Padayao, this volume).

Conformity

An ICM system is an auditable system. The ICM Code provides the rules of practice in an ICM system. The code enables local governments to

Figure 2. The ICM development and implementation cycle. (Source: Chua, 2008a)



undertake an ICM program following a standard planning and management framework and set of procedures, and to measure progress towards conformity with recognized international standards, e.g., ISO 9001 (Quality Management System) and ISO 14001 (Environmental Management System).

Collaborative partnerships

An ICM system ensures stakeholder consultation and participation across sectors throughout the planning and implementation process of the ICM cycle. Different stakeholders in a partnership can reduce project costs, target benefits more

effectively, and improve sustainability as the local community gains greater ownership over project activities (Kanchanopas-Barnette, et al., 2012; Erni, 2013; Cardinal, et al., this volume).

Scaling up and replication of the ICM system

The benefits of an ICM system have been expanded in coastal areas and watersheds throughout the regional coastline through geographical and functional scaling up, particularly for achieving the sustainable development goals. PEMSEA and its partners have set a target of covering approximately 25%

of the region's coastline by 2021 (Table 1) to further demonstrate and validate the viability and effectiveness of an ICM system. Enabling conditions have been established in support of this target. The experiences, challenges, and opportunities — which were documented in past studies and further complemented by succeeding case studies in the next section — are validations that the ICM system works. These conditions and achievements include:

- National policies, strategies, and legislative support have been enhancing the ICM system development and implementation at the local level (PEMSEA, 2012, 2015).
- Over 80 legislations directly supporting the implementation of the SDS-SEA have been enacted in the region (PEMSEA, 2012, 2015).
- The experiences across various political, social, and economic conditions amid a wide range of issues of local, national, and global concerns are indicative that the ICM system is doable and viable (Chua, 1998, 2006; Ross, 2012; Ye, et al., 2015).
- The ICM system provides an effective governance framework and operational processes across political systems be it a democratic system (e.g., Philippines, Indonesia, Malaysia) or a centralized system (e.g., PR China, Viet Nam, DPR Korea), and across economic systems, be it a developed nation (e.g., Singapore, RO Korea, Japan) or a developing nation (e.g., Timor-Leste) (Ganapin, et al., 2003).
- Local management capacity through learning by doing has created a significant core mass of highly skilled and competent managers, leaders, and practitioners (Hong, 2013; Chou and Jacinto, 2013; Bonga, et al., 2014).
- Stakeholder involvement has taken various forms but partnerships stand out as key to successful collaboration. Innovative partnership mechanisms have been created, and have helped implement interventions and targeted investments and research.
- An informed public has been providing a strong political base for ICM system implementation (Visal and Nay, 2012; Nava, 2013).
- Scaling up activities were a thrust, based upon the conclusions from the GEF Stocktaking Meeting in October 2010, from a need to scale up investments in the region covering a number of priorities and utilizing the network of partners.
- PNLG, or the PEMSEA Network of Local Governments for Sustainable Coastal Development, as provided for by its Dongying Declaration 2011, committed targets in the application of the State of the Coast and ICM Code by 2015.
- An initial batch of ICM sites have been conferred with Level 1 ICM certifications: in Cambodia (Preah Sihanouk); in PR China (Xiamen, Dongying, Fangchenggang, Lianyungang, Quanzhou, Haikou); in the Philippines (Batangas, Cavite, Bataan, Guimaras); in Thailand (Chonburi); and in Viet Nam (Da Nang, Thua Thien Hue, Quang Nam). More efforts are planned to make it a standard practice for ICM implementation. Underpinned by incremental, phased, and periodic re-evaluation, certifications can contribute to continual improvement.

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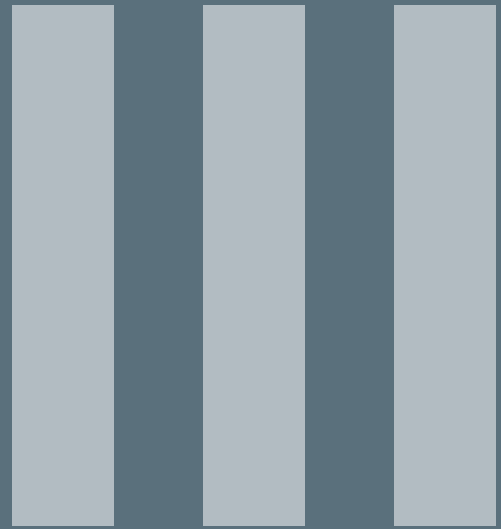
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Case Studies

Roles of the Key Elements of Governance in Integrated Coastal Management Practice

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Key Message

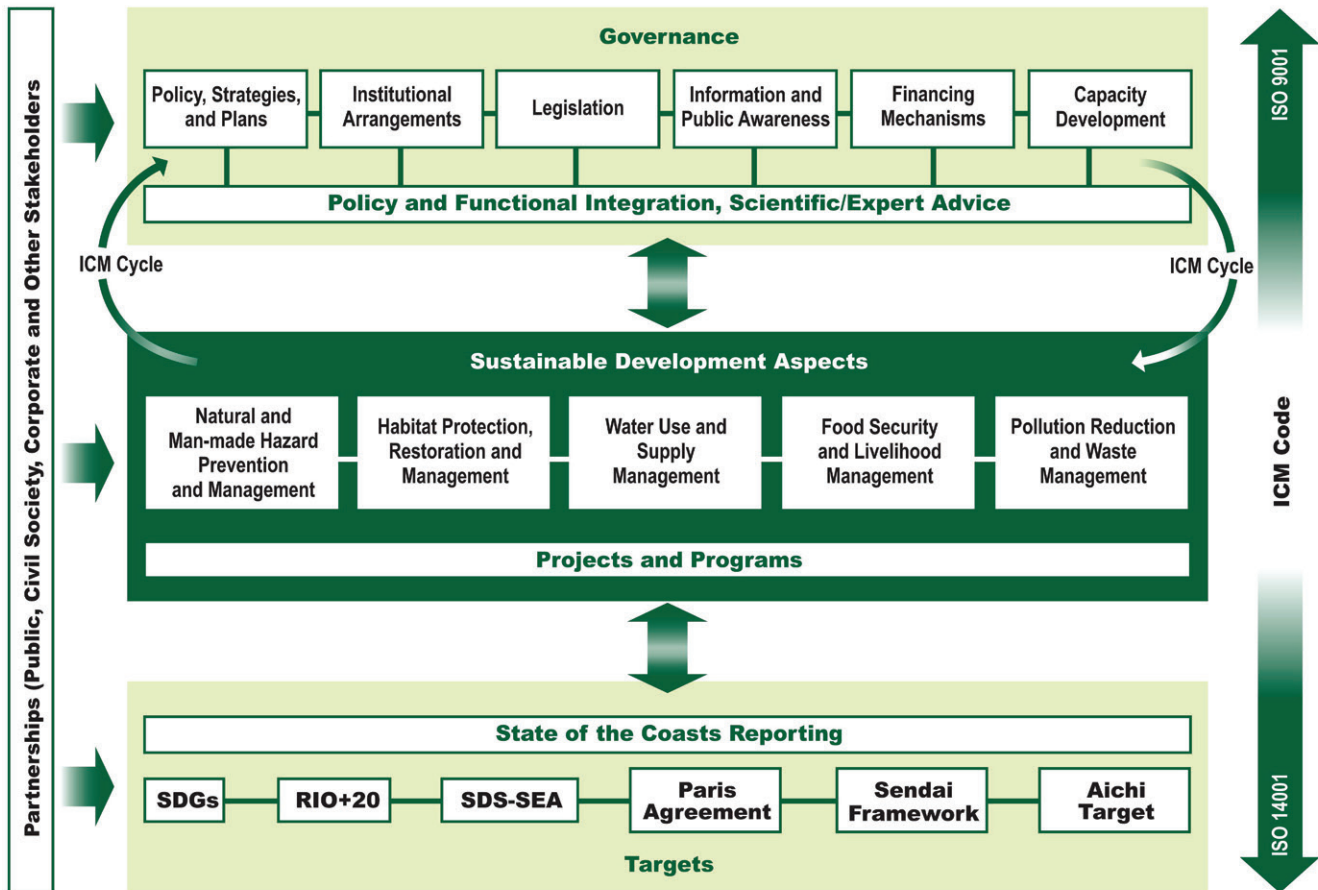
- The key elements of governance (i.e., policy, strategies, and plans; institutional arrangements; legislation; information and public awareness; financing mechanisms; and capacity development) are essential instruments supporting the functional operation of a comprehensive, holistic, and integrative coastal management plan and its implementation. They have been proven to be working, collectively or individually, but more so mutually reinforcing, under varying working conditions. They facilitate the achievement of time-bound targets for sustainable coastal development, especially at the local level through the creation of an enabling environment for good governance.

Abstract

More than two decades of PEMSEA's integrated coastal management (ICM) practice in the East Asian Seas (EAS) region has generated significant practical knowledge and insights pertaining to the design and composition of the governance component that makes up the Sustainable Development of Coastal Areas (SDCA) Framework of the ICM system (i.e., policy, strategies, and plans; institutional arrangements; legislation; information and public awareness; financing mechanisms and capacity development) (Chua, 2006; Chua, et al., 2006; Chua 2008a; Chua, 2013) (Figure 1). These key elements have proven to be necessary, mutually reinforcing, and effective despite operating under varying and often difficult social, economic, cultural, ecological, and political conditions. These governance elements as a whole strengthen the effectiveness of the ICM program for achieving sustainable

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Figure 1. Sustainable Development of Coastal Areas (SDCA) Framework of the ICM system.



coastal development. Case examples from eight ICM demonstration sites in the EAS region (Bali, Indonesia; Batangas, Philippines; Chonburi, Thailand; Da Nang, Viet Nam; Nampho, DPR Korea; Port Klang, Malaysia; Sihanoukville, Cambodia; and Xiamen, PR China) illustrate how each of the core element is applied in the course of ICM program development and implementation and their contribution to achieving program targets. Specific details on the operationalization of governance mechanisms in four ICM sites (Batangas, Chonburi, Da Nang, Sihanoukville) are also presented. Major lessons distilled from the application of the core governance elements in the ICM case studies in East Asia are highlighted.

Background

Managing the coastal areas, seas, and oceans in a sustainable manner was recognized as a global challenge in view of the complex issues and highly sectoral manner by which policies and institutions were being designed and implemented. The last two decades saw alarming reports of continuing habitat degradation, overfishing, biodiversity loss, poor water quality, and increasing pollutant loadings into major river systems and coastal and marine waters. The first global integrated marine assessment, also known as the First World Ocean Assessment, confirmed that the carrying capacity of the coasts and oceans was near or at its limit and called for urgent actions on a global scale to protect

the coastal and marine environment, mainly from human-induced impacts (MEA, 2005; UN, 2016).

Starting in 1993, countries in the EAS region, with financial assistance and technical support from the Global Environment Facility (GEF), United Nations Development Programme (UNDP), and International Maritime Organization (IMO) took up these global challenges in a regional programme on Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA). The regional programme was designed to address issues related to pollution abatement, biodiversity conservation, overexploitation of aquatic resources, natural hazards, loss of livelihoods, poverty, as well as issues related to multiple use conflicts, policy and management failures, among others, in an integrated manner. While the need for a paradigm shift from conventional, issue-specific coastal and marine management practice to a more structured, holistic, adequately coordinated and effective management regime was well-recognized by the participating countries (Box 1), the lack of a precise and tested operating modality for achieving sustainable development was a formidable constraint. As such, developing a working modality was one of the main priorities of PEMSEA during its early phase of operation.

PEMSEA developed and tested a pilot ICM project model in Xiamen Municipality in PR China and Batangas Province in the Philippines during its first phase (1993-1999) (Chua, et al., 1999; Chua, 2008b). The successful implementation of the regional project over a span of six years formed valuable lessons and insights which led to the design of an ICM operational governance and management framework, and a cyclical planning and implementation process (PEMSEA, 2006c, 2006d). The improved operating modality was further tested at the subnational level in six countries: Cambodia (Sihanoukville), DPR Korea (Nampho), Indonesia (Bali), Malaysia (Port Klang), Thailand (Chonburi), and Viet Nam (Da Nang) during PEMSEA's second phase (2000-

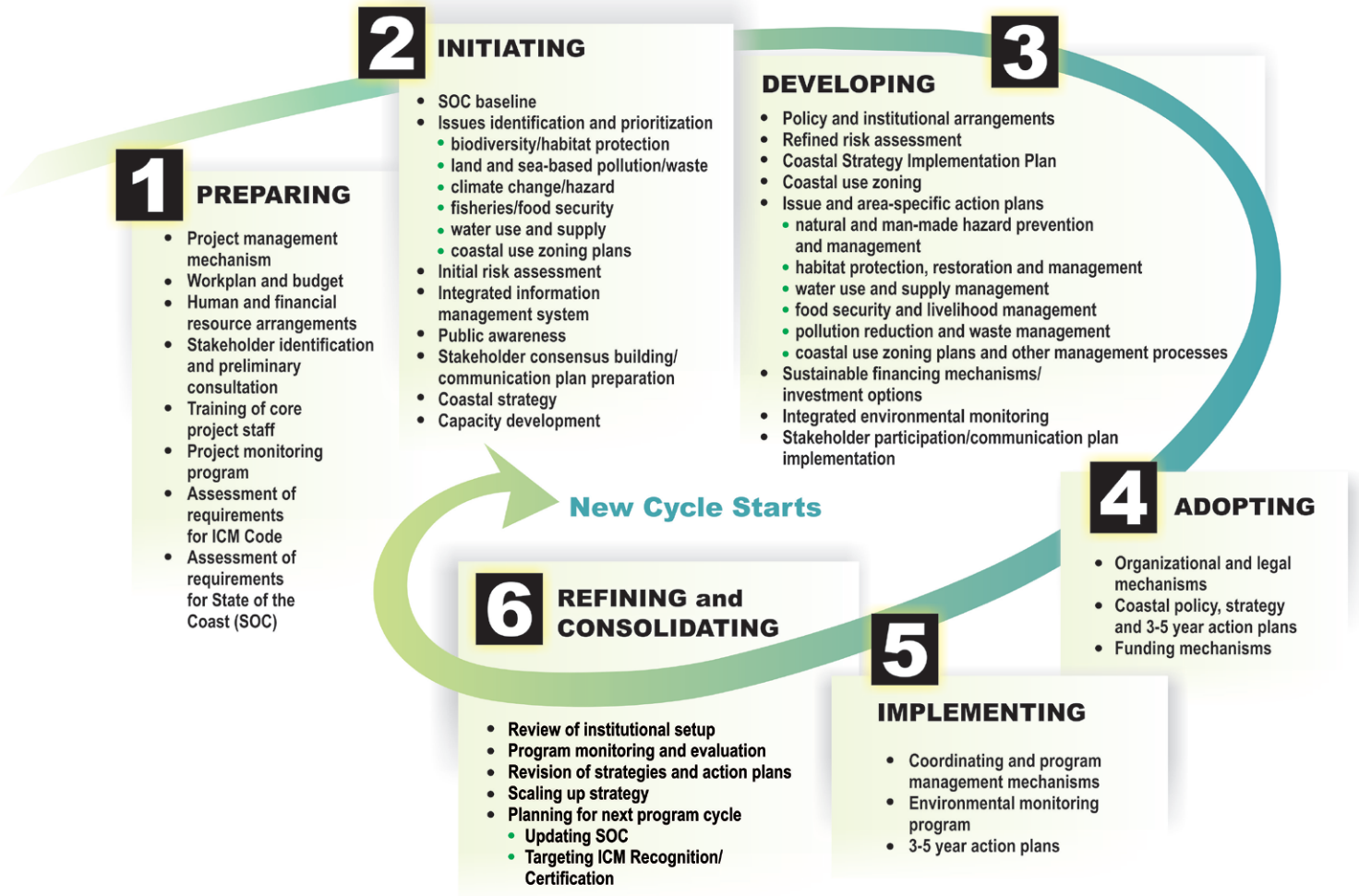
Box 1. Governance challenges in ICM practice.

- Lack of shared vision and long-term strategy for sustainable development of the coastal and marine areas
- Sectoral competition and limited interagency coordination
- Gaps and overlaps in legislation and limited capacity to enforce existing policies and laws
- Low level of awareness and appreciation for the value of ecosystem goods and services
- Sectoral competition for limited funds
- Limited technical and management skills and capacities

2007) (PEMSEA, 2006a). The outcomes of the new initiatives led to further development and improvement of the ICM operating modality with the establishment of a SDCA Framework (Figure 1) and the ICM cycle (Figure 2) (Chua, 2008a). One of the key components of SDCA Framework was the governance component, which comprised six sets of core elements (i.e., policy, strategies and plans; institutional arrangements; legislation; information and public awareness; financing mechanisms; and capacity development) (Box 2).

This review assesses the implementation of the core elements, particularly their individual and collective impacts, mutual reinforcement, and the rationale for their incorporation into a governance framework. Relevant knowledge and lessons distilled from the development and implementation of eight ICM sites over a span of 20 years is presented as a contribution to the consolidation of the sustainable development framework and the evolution of the ICM system.

Figure 2. The ICM development and implementation cycle. (Source: Chua, 2008a)



Approach and Methodology

This review examines the implementation of the core elements of governance. It also explores the ICM planning, adopting, and implementing processes to define the roles of the core elements, and their individual and collective impacts in achieving and enhancing the collective benefits of improved governance.

Results

Based on the outcomes of ICM implementation in various countries, the core elements of governance were proven to be working either collectively

or individually under varying socioeconomic, political, and environmental conditions. These core elements were familiar to most line agencies and thus were easily accepted. For example:

- **Policy, strategies, and action plans and legislation** are conventional governance tools for sector or issue-specific management at national and subnational levels. As such, the incorporation of these elements into the governance component of ICM programs did not pose any difficulty.
- **Public awareness and stakeholder consultations** were generally applied in past coastal management practices, their inclusion as strategic and important tools of governance

Box 2. Governance component of the SDCA Framework (PEMSEA, 2009; Chua, 2008a).

1. **Policy, strategies, and action plans:** establishing and adopting policy reforms, shared visions and missions, long-term strategies and actions plans that express intention, direction, targets and timeframe for managing marine and coastal resources and their sustainable use through an integrated approach.
2. **Institutional arrangements:** operationalizing interagency and multisectoral coordinating mechanisms that involve concerned stakeholders in planning, implementing, evaluating and continually improving programs for sustainable development through ICM applications.
3. **Legislation:** developing and implementing national legislation and/or local administrative orders, which support new and existing policies that facilitate the effective implementation of ICM.
4. **Public awareness and information management:** putting into operation communication strategies and plans for ensuring that stakeholders are informed of the scope, benefits and threats to their local ecosystems, and the programs that are being developed and implemented to reduce threats and enhance benefits.
5. **Financing mechanisms:** institutionalizing the measures and means to support conservation of resources and required environmental infrastructure improvements through public- and market-based sources.
6. **Capacity development:** incorporating capacity development as an indispensable component of all aspects of sustainable development programs, from inception and implementation to monitoring and evaluation and, in particular, equipping local personnel and managers with the essential technical and management skills to plan and manage coastal areas and resources.

required the understanding, cooperation, and support of local and national authorities depending on their political and social system. The effective and strategic use of information tends to widen public awareness, resulting in the creation of an informed public.

- **The inclusion of financing mechanisms and capacity development** as core elements of governance was certainly new to most countries, although financial requirements and capacity development were often addressed separately and not strategically in the program development stage which required a deliberate focus right at the start. However, these two

core elements were well-recognized. Without a sustained budget, it would be difficult to achieve the set program goals and targets. Similarly, without competent coastal managers and technical staff at the local level, most management activities would face tremendous implementation challenges. This was especially so when the conventional education system had yet to generate the types of coastal managers capable of managing coastal and ocean complexity.

The ability of all the ICM sites to incorporate the six sets of core governance elements in their ICM program development and implementation

fully testified to: (a) their general acceptance; (b) feasibility and implementability under varying working conditions; (c) the positive impacts accrued, and (d) replicability to other sites.

Table 1 shows how four ICM sites in Cambodia, Philippines, Thailand and Viet Nam were able to establish and operationalize the six elements of governance in the course of implementing their respective ICM programs. In all ICM sites, adaptive management characterized ICM practice in addressing existing and perceived challenges as well as opportunities.

Policy, strategies, and action plans

ICM implementation is greatly facilitated by a national coastal or marine policy that provides the vision and strategic direction or reforms in current policies to ensure sustainable development of the coasts and oceans. Prescriptions from internationally and regionally set and agreed agenda and agreements, such as Agenda 21, World Summit on Sustainable Development (WSSD) Plan of Implementation, Millennium Development Goals (MDGs), Sustainable Development Goals (SDGs), Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), and various international conventions (i.e., climate change, biodiversity, etc.) also drive the development of coastal and marine policy. However, prior to the regional implementation of ICM initiatives, no country in the East Asian region had established a national coastal/ocean policy or even a national strategy. Sectoral policy (such as maritime transport, fisheries) or specific resource use policy (such as oil exploitation, mining) was the norm. Most coastal and marine policy began to take shape in some countries in the region after the implementation of the regional ICM program in 1994 (Box 3). As such, the development of appropriate coastal policy for the early ICM sites was largely based on the widely accepted international agreements on sustainable development (i.e., the Stockholm agreement 1982,

WSSD 2002, and other subsequent UN agreements) to which countries in the region were parties. The introduction of the ICM concept and approach therefore received enthusiastic support from the concerned governments and, at the same time, endorsement from national and local governments hoping to generate and test its effectiveness at the local level. ICM was promoted and well-received by most government agencies and stakeholders as a means to achieving sustainable development objectives. As such, local coastal policy was developed and adopted to set the direction for the local governments and stakeholders in achieving the shared visions, strategies, and actions plans, which were closely linked to sustainable use of natural resources, protection of environmental quality and biodiversity conservation, and sustainable livelihoods. Most of the time, the action plans were aligned with the existing environmental management objectives of the government (Table 1).

The visible outcomes of these early initiatives had strong impact in catalyzing the development of national coastal and ocean policies several years later.

Another key element which drove the development of ICM program was the “vision-oriented environmental management plan.” The development of such plan was guided by the shared vision of the stakeholders as part of the output of the ICM planning process. With a clear vision, appropriate strategies for the long-term and specific time-bound action plans were then formulated, taking into consideration the local social, economic, and political conditions. All the eight ICM sites were able to successfully utilize this governance element for the development of their coastal strategies or strategic environmental management plans and programs of actions that systematically addressed their prioritized environmental concerns (ITTXDP, 1996; PGENRO, 1996; PC Da Nang, 2001; LUAS, 2003; NIDP Bali, 2005; PC Nampho, 2004; NIDP Sihanoukville, 2005). Subsequently, other ICM sites like Bataan Province (Philippines), Quang Nam

Table 1. Elements of governance in four ICM sites.

	Policy, strategies, and plans	Institutional arrangements	Legislation	Information and public awareness	Financing mechanisms	Capacity development
Sihanoukville, Cambodia	<p>Coastal Strategy (CS) was adopted through a declaration signed by Dr. Mok Mareth, Senior Minister of the Ministry of Environment (MOE), on 5 June 2003.</p> <p>Implementation of pilot projects on waste management in Sangkat 4, tourism development and management in Ochheuteal beach, habitat protection, and water resource management in Stung Hav.</p> <p>Monitoring and evaluation (M & E) was done through quarterly reporting of activities/ accomplishments to Project Coordinating Committee (PCC).</p> <p>Being updated into SHV SD Plan to expand the geographic coverage and issues.</p> <p>Coastal Strategy Implementation Plan (CSIP) integrated into the Sihanoukville Public Investment Plan for 2005–2007 and 2009–2011.</p> <p>SD Plan covering 2014–2018 was in line with the Provincial Development Plan.</p> <p>Coastal Use Zoning (CUZ) scheme was developed and adopted in 2005. Its implementation is being focused on sustainable tourism, fisheries and protected areas.</p>	<p>21-member PCC was organized by the Municipality in 2001, which served as the multisectoral governing body for ICM implementation (Deka* No. 080, 19 November 2001).</p> <p>There were eight member-agencies of the PCC including environment, autonomous port, tourism, agriculture, fishery, land management and construction, and public works and transport and three district governors.</p> <p>PCC met quarterly to discuss the implementation of activities and to provide timely advice on the resolution of issues.</p> <p>Project Management Office (PMO) served as the secretariat to the PCC and a focal point for multisectoral activities for ICM development and implementation. It was established on 13 November 2001 through Deka No. 074.</p> <p>Four full-time staff were assigned in the PMO with an annual operating budget of about US\$ 25,000 coming from various sources.</p> <p>Technical Working Group (TWG) for ICM implementation was organized on 3 August 2007 through Deka No. 80. The TWG was composed of nine members from various agencies.</p>	<p>Deka No. 080, passed on 19 November 2001, adopted ICM as the approach for SD of the marine and coastal areas of the province.</p> <p>This <i>deka</i> also established the supporting mechanism for ICM including the PMO and the PCC with corresponding budget and staff allocation.</p> <p>Enforcement of laws on fisheries was a major activity of the Provincial Fishery Administration through the inspection of aquaculture farms, licensing and permitting of fishery activities, and patrolling of fishing grounds. There was an increasing number of reported cases of fisheries violations, which signaled the increasing capacity of the administration to monitor illegal activities.</p> <p>CUZ was adopted on 30 May 2005 by the National Coastal Steering Committee (NCSC).</p> <p>There was a significant increase in the number of documented cases of fishery resource violation which can be attributed either to a more effective enforcement or the reporting and documentation of fishery violations.</p>	<p>In 2001, a communication plan was developed but limited capacity of local staff hindered the full implementation of the plan.</p> <p>Public awareness campaigns were done through dissemination of brochures, posters and putting up billboards/signages in project sites at the commune and village levels.</p> <p>There were growing interests among the people on coastal management activities as seen in the increasing number of community members participating in mobilization activities.</p>	<p>Grants and loans were the main sources of funding for coastal and marine management in the province.</p> <p>Co-financing of projects was still very much <i>ad hoc</i>.</p> <p>There were several opportunities for financing ICM implementation in the province such as the establishment of user fees for tourists.</p> <p>Local government budget.</p>	<p>Several capacity development opportunities were provided by national, regional and international organizations, which contributed to an increased understanding of ICM-related activities.</p> <p>The PMO, TWG, task team members and other local government officials participated in various on-site and regional capacity development activities. Staff competence was improved over the years as seen in their ability to carry out various projects.</p> <p>Amount allocated for capacity development in 2008-2011 was US\$ 85,000 including GEF budget (US\$ 35,000) and local counterpart of US\$ 50,000.</p>

* *Deka* - local ordinance

	Policy, strategies, and plans	Institutional arrangements	Legislation	Information and public awareness	Financing mechanisms	Capacity development
Chonburi, Thailand	<p>CS was developed for the five municipalities in 2001.</p> <p>In 2009, ICM implementation involved 26 local government units covering the entire provincial coastline, and by the end of 2010, noncoastal local government units joined in implementing ICM in the entire province.</p> <p>The scaling up of ICM implementation was catalyzed by the development and adoption of a CS.</p>	<p>PCC was headed by the vice governor and consisted of representatives from the government, private sector, academe, and NGOs.</p> <p>PMO included a local government consulting committee, consisting of the heads of participating local governments, a Secretariat at Sriracha Municipality, and four sections responsible for planning, technical information and services, financial management and monitoring and evaluation.</p> <p>The coordination and management mechanism was supported by provincial and municipal orders.</p>	<p>Provincial Order No. 2020/2547 (issued in September 2004) adopted the CS and ICM as an approach for the sustainable development of marine and coastal areas of Chonburi Province.</p> <p>Provincial Order No. 673/BE 2549 (issued on 17 May 2006) established the present structure of the ICM coordinating and management mechanism.</p> <p>Sriracha Municipal Order 207/BE2549 (issued in June 2006) established specific arrangements for the ICM Secretariat in the municipality. Several provincial orders were subsequently issued with the participation of additional local governments.</p>	<p>Communication plan in support of ICM development and implementation was prepared targeting local leaders, teachers, fishers, youth, and restaurant owners.</p> <p>Initial implementation of the Chonburi ICM Action Plan for 2006-2008 focused on the Inform Strategy. In 2007, budget allocation for public education and awareness was approximately Baht 4-5 million (US\$ 125,000 - 156,000) for 26 local government units.</p>	<p>A mechanism was established that enabled local governments to allocate funds to support ICM implementation and to mobilize financial support from various partners including central government agencies, commercial enterprises, private schools, oil industry groups, commercial enterprises, and foreign donors and funding agencies, for the implementation of various activities.</p> <p>The key approach was to incorporate priority actions in the ICM Action Plan into the local development plans and budgets, and to identify activities from the ICM Action Plan that could potentially be supported by various partners in accordance with their interests and mandates.</p>	<p>Several capacity development opportunities on ICM and related technical tools were facilitated by PEMSEA.</p> <p>Through the three-year ICM Action Plans, a budget was allocated annually by the local governments for capacity building of local officials and personnel on ICM through study tours and participation in trainings, conferences and various forums for knowledge-sharing and learning. Local capacity to implement ICM was enhanced by the presence of several universities, institutions and experts in Chonburi, which provided technical support to various ICM activities.</p>

	Policy, strategies, and plans	Institutional arrangements	Legislation	Information and public awareness	Financing mechanisms	Capacity development
Batangas, Philippines	<p>From the Strategic Environmental Management Plan (SEMP) developed in 1996 for the Batangas Bay Region, a SEMP covering the entire province was developed and adopted.</p> <p>The Province showed significant progress in expanding its management strategies for sustainable development of the coastal and marine areas over the past 14 years.</p> <p>Starting in Batangas Bay in 1994, ICM programs expanded to the entire coastline of the province.</p> <p>From 1996, Provincial Government - Environment and Natural Resources Office (PG-ENRO) published its annual accomplishment reports on SEMP implementation, as part of the ICM program in the province.</p> <p>Batangas Province SEMP 2005–2020 was incorporated into the Comprehensive Land Use Plan (CLUP)/Physical Framework Plan of the province.</p>	<p>The Batangas Bay Region Environment Protection Council (BBREPC) was established and institutionalized through Provincial Ordinance 1 Series of 1996 as the coordinating mechanism for ICM implementation in the Batangas Bay Region.</p> <p>It evolved into a province-wide Batangas Environmental Protection Council (BEPC), which served as the coordinating mechanism for ICM implementation across the province.</p> <p>BEPC integrated the three bay-wide ICM boards and Municipal ICM Councils, which was approved by the Provincial Legislative Board.</p> <p>PG-ENRO was established through Ordinance No. 3 series of 1995 as the technical secretariat of the then BBREPC and coordinating office for the implementation of the SEMP for Batangas Bay.</p> <p>PG-ENRO was tasked as the technical secretariat of the BEPC for ICM implementation in the province. Three full-time PG-ENRO staff were allocated for ICM coordination and implementation in 1999.</p>	<p>Sufficient legal instruments were put in place in the Province to fully enable the implementation of ICM, and to guard against unsustainable use of marine and coastal resources.</p> <p><i>Bantay Dagat</i> (Sea Patrol), a civilian volunteer patrol force composed of fishers, was a key partner of the local government in enforcing fishery-related regulations.</p>	<p>A communication plan was developed in 2000 at the provincial level.</p> <p>From 1996 to 2007, financial source for the implementation of the communication plan was part of the PhP 500,000 (US\$ 10,000) allocation for the BBREPC. After 2007, PhP 400,000 (US\$ 8,000) was allocated for public awareness on the environment, which was separate from the BBREPC budget.</p> <p>Presence of strong environmental partners (nongovernmental organizations and civil society) in the province provided a great advantage in promoting awareness raising campaigns.</p> <p>Since 2003, the annual International Coastal Cleanup (ICC) was a regular activity of the province and the coastal municipalities.</p>	<p>Annual allocation for PG-ENRO operations increased from PhP 4,151,896 (US\$ 83,000) in 1996 to PhP 17,299,234 (US\$ 346,000) in 2007. In 2008, PhP 12.1M (US\$ 242,000) was allocated for PG-ENRO operations including PhP 5.3M (US\$ 106,000) for special environmental projects.</p> <p>The budget allocated by the Provincial Government for PG-ENRO operations totalled PhP 39M (US\$ 780,000) (2005-2008). Allocations for other sectors, such as agriculture, safe water supply and sanitation, and health was approximately PhP 325M (US\$ 6.5M) in 2008.</p> <p>Grants from financing institutions and other donors (First Philippine Conservation, Inc., Batangas Coastal Resources Management Foundation, PEMSEA, CI-Philippines, WWF-Philippines), among others, were provided for coastal management implementation in the province.</p> <p>Divers' fees in Mabini and Tingloy were implemented since 2003. The collection of fees increased from PhP 225,000 (US\$ 4,500) in 2003 to PhP 2.5M (US\$ 50,000) in 2007. 85% and 80% of the fees in Mabini and Tingloy, respectively, were utilized for management of the coastal areas and resources.</p>	<p>64 staff from local government units, including Mayors, and 27 provincial staff, including 23 PG-ENRO staff, were trained in ICM.</p> <p>Of the 64 trained from LGUs, 27 worked in positions related to coastal management. ICM training was conducted on-site by PEMSEA (1995, 1996, 1998); WWF-Philippines/SEARCA (2001, 2006) and CI-Philippines/PCAMRD (2006). PG-ENRO personnel (3) allocated for ICM were university graduates in social and natural sciences.</p> <p>The ICM Training Center established at PG-ENRO in 1999 was a venue for study tours and cross-site visits from within the Philippines and other countries. ICM orientation and sharing of lessons learned and practical experiences in implementing ICM were conducted by PG-ENRO staff to hundreds of participants of study tours and cross-site visits.</p>

	Policy, strategies, and plans	Institutional arrangements	Legislation	Information and public awareness	Financing mechanisms	Capacity development
Da Nang, Viet Nam	<p>CS was approved by the People's Committee (PC) in 2001 and declaration of the commitment was signed by representatives of Da Nang government and the 6 districts and 1 suburban district.</p> <p>Based on the CS, the city government developed a policy to transform Da Nang into an Environmental City by 2020 (Decision No. 41/2008/QĐ-UBND dated 21 August, 2008 of People's Committee of Da Nang City).</p> <p>Since the Da Nang CS was published and action plans were approved, all departments, agencies and districts in the city integrated related action plans into their respective sector's development plans.</p>	<p>The PCC was established through the decision of the city's PC. The vice chair of the PC served as chair, and leaders of related departments, sectors, districts, and unions as members.</p> <p>The PCC conducted periodic meetings to review the outputs of the ICM program and identify effective solutions to address the difficulties in implementation.</p> <p>The PMO with four full time staff served as day-to-day coordinator for the ICM program.</p> <p>The PCC Assisting Group (TWG) which included representatives from related departments, districts, and social organizations, and associations, provided technical support for members of the PCC in their respective units.</p> <p>In each related unit, there was one member of the PCC and one member of the PCC Assisting group. The number of staff participating in the coordinating mechanism varied from at most 60 to at least 52 people.</p> <p>The technical advisory group provided advisory function and support for technical activities of the project.</p>	<p>Legislations for the following aspects of ICM implementation were enacted.</p> <ul style="list-style-type: none"> • Establishment of multisectoral and interagency coordinating committee and provision of the operational mechanism • Mechanism for synthesis planning, approval, and implementation of coastal resource and environment management • Mechanism for implementation of coastal use zoning plan • Integrated management and information/data sharing • Implementation of environmental monitoring • Development of local resources • Mechanism to create sustainable financial resources 	<p>A communication plan on ICM program was developed and implemented since 2001. In addition, sectors and mass media, and social organizations implemented various communication activities for different audiences in the city.</p> <p>A network of collaborators with communication skills was established.</p>	<p>Da Nang allocated VND 4 billion for the implementation of the ICM project and budget to relevant units for the implementation of the priority actions identified in their respective action plans.</p> <p>The city government mobilized funds from international loans and funding from NGOs to invest in the ICM program. In the second phase of the project (2009-2011), the city approved funding of VND 220 billion (US\$ 10 million).</p> <p>The city invested US\$ 44 million for priority environmental infrastructure projects.</p>	<p>Danang organized and participated in the following capacity building programs</p> <ul style="list-style-type: none"> • ICM training • Special skills training of staff from related departments and agencies particularly on ICM tools such as GIS/IIMS; risk assessment and management; integrated environmental monitoring; design and contingent evaluation organization • Regional and local training courses on coastal environmental and management approach • Professional capacity for project staff through practice courses • Training for communicator group to facilitate the implementation of activities to enhance public awareness <p>Da Nang University was designated as ICM Learning Center</p>

Box 3. National coastal and ocean policies.

- **Indonesia:** National Ocean Policy (2014); National Act on Management of Coastal Zones and Small Islands (2007) requires the development of ICM programs in all coastal provinces of Indonesia.
- **Japan:** Basic Act on Ocean Policy and Basic Plan on Ocean Policy 2013 require the integrated management of land and sea and the establishment of a coordination system for ICM to be led mainly by local governments.
- **Philippines:** Executive Order 533 (2006) adopting ICM as a national strategy to ensure the sustainable development of the country's coastal and marine environment and resources and establishing supporting mechanisms for its implementation.
- **RO Korea:** Coastal Management Act 1998 requires coastal provinces to implement ICM programs; National ICM Plan 2011-2020.
- **Thailand:** Marine and Coastal Resources Management Promotion Act (2015) requires all coastal provinces to establish interagency Provincial Committees on Marine and Coastal Resources and to develop marine and coastal resources management plans.
- **Viet Nam:** Law on Marine Resources and Environment of Seas and Islands (2015) focusing on institutionalizing the mechanisms for integrated management; National ICM Strategy to 2020 and Vision to 2030 and National Action Plan 2016-2020.

and Thua Thien Hue (Viet Nam) also developed and adopted their respective coastal strategies and action plans, following the same consultative and consensus-building process prescribed in the ICM cycle.

True to its form as a “people’s strategy”, the action plans developed were designed to meet the interest of the majority of the stakeholders, and more importantly, they reflected the common aspirations of the people. The coastal strategies adopted a long-term scenario in addressing multiple use conflicts, improving environmental quality, preserving biodiversity, promoting environment-friendly economic development, and creating environmental investment opportunities. All these actions were directed towards attaining sustainable development. The action plans developed also provided indications of required infrastructure,

services, capacity building, and other amenities; all designed to achieve the desired objectives. In a number of ICM sites such as Batangas (Philippines) and Da Nang (Viet Nam), coastal management-related projects and investments that were implemented were able to align their objectives with the goals and targets of the Strategic Environmental Management Plan (SEMP) and coastal strategy, respectively.

The implementation of the coastal strategy marked the beginning of a “long march” towards good governance that could be manifested only through combined efforts of all stakeholders concerned. For example, in the Philippines, roles and responsibilities of government agencies, industry/private sector, and community groups in the ICM sites were delineated, and a partnership agreement in the form of a ‘declaration of commitment’ was

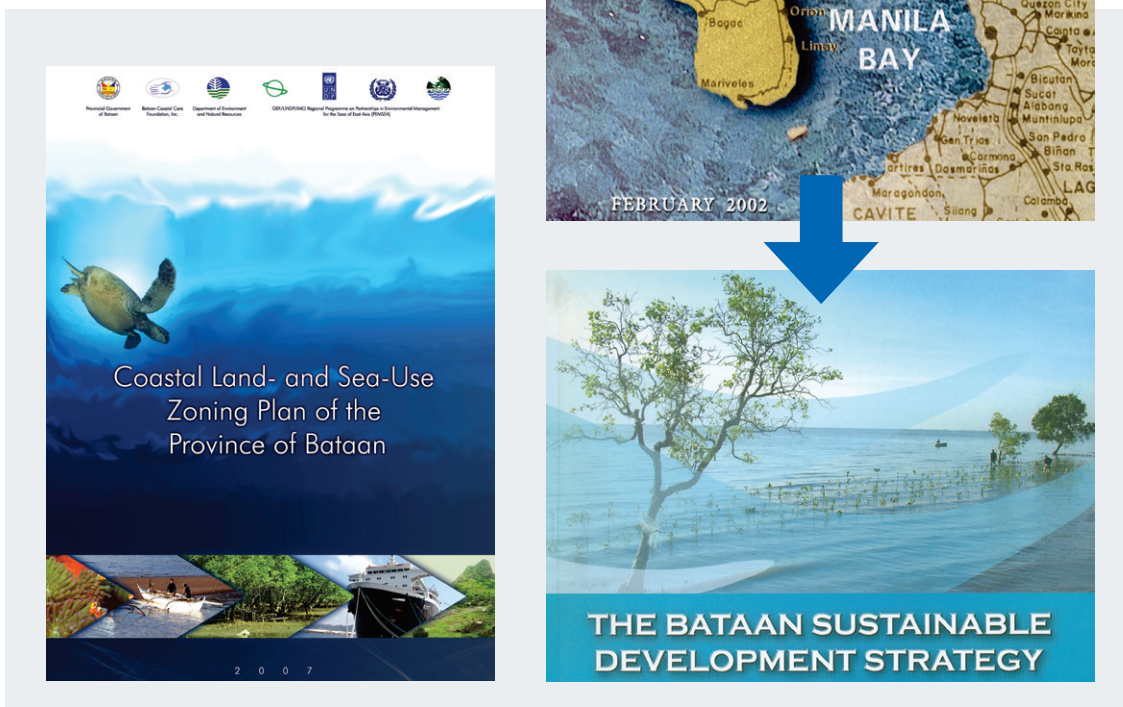
Figure 3. Coastal Strategy Declaration Workshop in Da Nang (Viet Nam) and Bali (Indonesia)



signed by the concerned parties as a symbolic gesture of ownership and support (Figure 3). The development and implementation of the coastal strategy was seen as an effective mechanism in forging political support for the needed policy reforms.

ICM sites like Bataan (Philippines) updated the Bataan Coastal Strategy to address emerging concerns (e.g., climate change and sea level rise in Manila Bay) and development of the province (e.g., preferred location for eco-industrial investments by 2020) (Figure 4).

Figure 4. Updating of the Bataan Coastal Strategy and development of integrated land and sea use zoning plan.



To further support the implementation of the Bataan Sustainable Development Strategy, an integrated coastal land and sea use zoning plan was developed, the first in the Philippines that complemented the existing comprehensive land use plan of the province (BICMP, 2007). The plan provided a well-defined distinction among different zones, which was classified according to their existing and proposed level of development, resource utilization, and resource abundance or scarcity. It therefore facilitated resolution of use conflicts.

Another case example was the updating of the Strategic Environmental Management Plan for Batangas Bay in line with the geographic scaling up of the ICM program to include the two adjacent bays, Balayan Bay and Tayabas Bay, covering the entire coastline of the province (Figure 5) (PGENRO, 2005). The process of updating conformed to the prescribed ICM guidelines of forging the shared vision and

mission, prioritization of issues and concerns, and formulating the strategies and issue-specific action plans with the engagement of all relevant stakeholders of the province.

Institutional arrangements

A functional coordinating mechanism is essential in ICM program development and implementation. It can harmonize the overlapping institutional responsibilities, as well as the competing interests of the various stakeholders. It can identify the gaps in mandates and responsibilities and ensure that the policies and management interventions are integrated in a cohesive manner. More importantly, it can provide policy direction and coordinate interagency and multistakeholder involvement in ICM program implementation. It can also allow adaptive management measures to be undertaken based on the collective wisdom of the stakeholders (e.g., cognitive knowledge and experience) in light of lack or limited scientific information.

Figure 5. Updating of the Batangas Bay Strategic Environmental Management Plan into a province-wide SEMP.



In the eight ICM demonstration sites, the interagency, multisectoral coordinating mechanism was established and their operationalization was supported by local administrative ordinances, executive orders, decisions, and resolutions issued by the local government. In all cases, the coordinating mechanism was chaired or supervised by the head of the local government (e.g., governor, mayor, or vice mayor). As a non-negotiable component of ICM governance, other ICM sites also established their coordinating mechanisms in various forms and structures, but incorporating the basic components of the mechanism, such as the establishment of a coordinating committee (e.g., Xiamen, Da Nang), council (e.g., Batangas, Bataan) with support from technical/expert advisory/working group, and a coordinating office (Figure 6).

In Guimaras and Bataan (Philippines), the structure of the coordinating mechanism evolved in line with the institutionalization of the mechanism. The final structure included five sub-committees that correspond to the five sustainable development aspects of the SDCA Framework (Figure 7). In Bataan, the coordinating mechanism was transformed into the Bataan Sustainable Development Council through the issuance of Executive Order 18, series of 2015, where the council was tasked to act as the governing body mandated to set policies and guidelines for the implementation of the Bataan Sustainable Development Strategy. The project management offices at both sites were set up as regular units of the environment and planning offices of the local government.

The institutionalization of the coordinating mechanism signified the level of success of the ICM program in ensuring its sustainability. Similar to Bataan (Philippines), the City Government of Da Nang (Viet Nam) issued Decision No. 3651/QD-UBND on 5 June 2014 transforming the ICM Project Coordinating Committee (PCC) into the Steering Committee on Integrated and Unified

Coastal and Marine Resources and Environment Management, expanding the role of the PCC on integrated management of the sea and islands in line with the institutional reforms at the national level.

While the importance of the coordinating mechanism was well-recognized, challenges remained, particularly in relation to changes in local leadership as well as in ICM focal persons. The institutionalization of the mechanism was an effective measure to adapt to policy, administrative, and political changes.

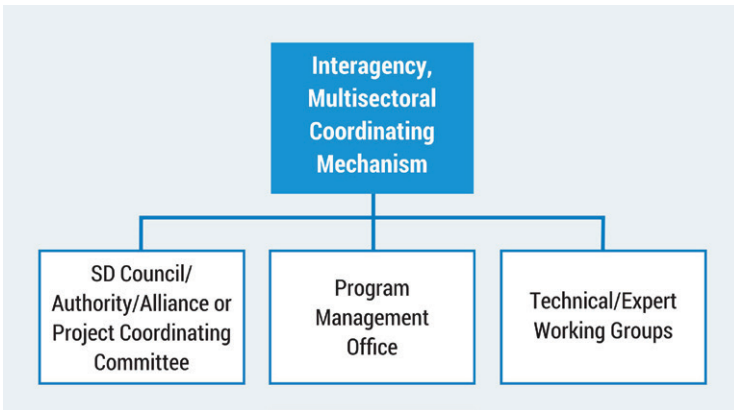
Legislation

Legislation provides the legal basis for the implementation of a range of activities of the ICM program, including enforcing compliance. The goals and objectives of the ICM program must therefore be supported by clear, adequate, enforceable, and effective legislation, which defines what is required, permitted, and prohibited in the coastal and marine areas.

With the exception of the Republic of Korea, countries in the region have not enacted specific ICM legislation. Provisions on ICM were either incorporated into existing laws, such as in the case of Indonesia, Japan, Thailand, and Viet Nam (Box 3). The Philippines, on the other hand, embarked on process of developing and adopting the ICM Bill. The ICM Bill captures the provisions of an earlier Executive Order 533 (Box 3). In the absence of ICM legislation, general or sectoral legislation support ICM implementation.

In countries where local authorities have the legislative power, ICM facilitated the streamlining and harmonization of existing legislation. Xiamen, for instance, which is one of the five economic autonomous regions of PR China, has the power to legislate. In the Philippines, under the Local Government Code, the provinces and

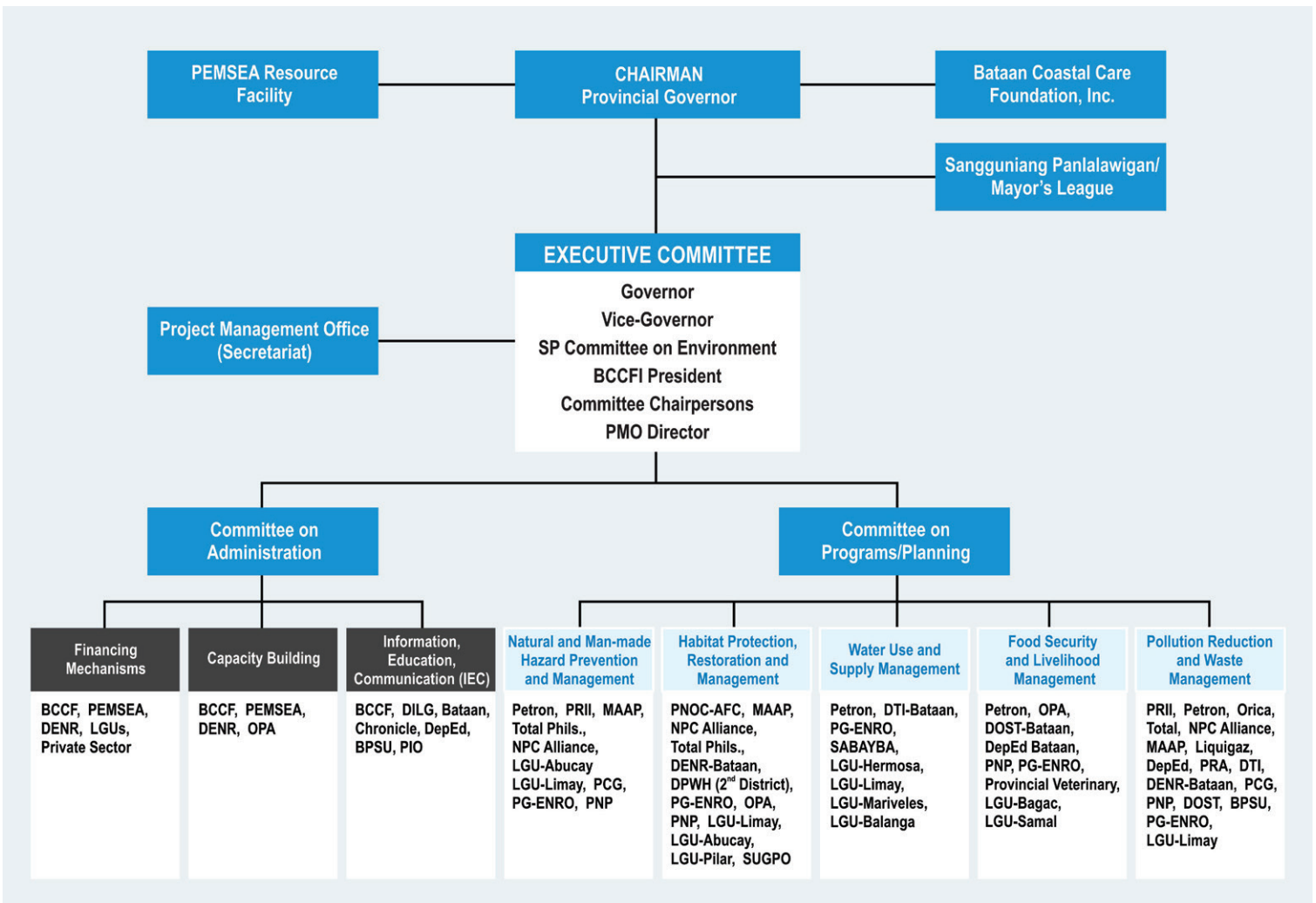
Figure 6. Basic components of an interagency, multisectoral coordinating mechanism.



municipalities also have legislative power over the management of their natural resources, especially within the 15-km municipal water boundary in the case of municipalities.

In Xiamen, local legislation related to environmental management was developed, adopted, and implemented as a result of ICM initiatives since 1994. Legislation and ordinances were issued pertaining to the use of sea areas, implementation of functional zoning schemes, and allocation of sites for aquaculture practices and shipyards, control of eel fry gathering, management of navigation in Xiamen waters,

Figure 7. Bataan Sustainable Development Coordinating Council.



and management of Yuan Dang lagoon. The zoning schemes were approved through legislation from the People's Congress on regulation on the use of sea areas in 1997. One of the immediate effects of the said legislation was the reduction of vessel collision in the shipping lanes where eel fry gatherers congregate to fish during the spawning season. More importantly, it transformed the unplanned, unregulated sea use practices into systematically planned, regulated sea use activities in clearly defined zones based on the functional characteristics of the area (Chua, 2008b).

Law enforcement is always a key issue at the national and local levels. In Xiamen, a multi-agency law enforcement mechanism was set in place. The Marine Supervision Brigade, a supervisory force consisting of harbour, fishery, water policy and environmental supervisors, was formed under the Xiamen Ocean and Fisheries Bureau and organized into an integrated law enforcement group (McCleave, et.al., 2003). The formation of this enforcement group improved law enforcement and supervision of the implementation of the marine functional zonation.

In Batangas (Philippines), enforcement of fishery-related ordinances was facilitated by the Provincial Government Environment and Natural Resources Office or PG-ENRO (created under the ICM program) through the establishment of the *Bantay Dagat* (Sea Patrol) Network, a civilian volunteer patrol group comprising mostly local fishers selected by their communities and trained by the Bureau of Fisheries and Aquatic Resources (BFAR) and the local government (Sollestre and Padayao, 2009). The network included around 400 volunteers who helped the marine police patrol the municipal waters and enforce marine protected areas and closed season ordinances (Figure 8).

In December 2014, the Batangas Provincial Government with support from the USAID ECOFISH Project and in collaboration with the nine municipalities encompassing Balayan Bay implemented the *Pagpapahinga ng Look ng Balayan* (rest period for Balayan Bay), a 20-day program to temporarily stop the commercial harvesting of two economically important fish species [*galunggong* (*Decapterus macrosoma*) and *matambaka* (*Selar crumenophthalmus*)] using three



Figure 8. Batangas *Bantay Dagat* Network.



fishing gears (i.e., purse seine, ring net, and bag net). The nine concerned municipalities passed uniform ordinances banning the three fishing gears. The collaboration among the Bantay Dagat Network, the Maritime Group of the Philippine National Police, BFAR's Monitoring, Control and Surveillance vessels, and the Philippine Coast Guard was highly effective and resulted in zero violations of the seasonal closure (CRC, 2015; ECOFISH, 2015).

Information and public awareness

Creating a broad spectrum of support for the ICM program requires that all stakeholders understand and recognize its benefits and their role in the process. By creating awareness among stakeholders, they can be in a better position to make informed choices and actions. The ICM process promotes continuous dialogue and communication with the major stakeholders and the general public such that implementation of public awareness and information, education, communication (IEC) strategies are embedded throughout the ICM cycle (Bonga and Chua, *this volume*). A communication plan, one of the key outputs of the ICM process, aims to keep the public informed throughout the course of ICM implementation, the ultimate outcome of which is to generate widespread public support for the ICM program and more importantly, to alter the way people think and behave about a particular issue.

The communication plans developed by the eight ICM demonstration sites basically shared the same attributes: (a) identifying target audience, determining the attitudes and behavior of the target audience about governance and environmental issues; (b) developing specific messages and strategies for each target audience; (c) identifying the most appropriate communication channel to convey the message; (d) agreement on the timeframe to implement the plan, budget sources and responsibility centers; and (e) defining the indicators for evaluating

the effectiveness of the communication activities. However, the level of approach and implementation were very much determined by the social and political conditions of each site. As a whole, good efforts were made by all sites to reach out to various types and levels of stakeholders. However, in Nampho, Xiamen, and Da Nang, greater emphasis was directed at the government agency level as the support of government agencies could generate strong political support for the ICM program.

A diversity of approaches was utilized by the ICM sites in the conduct of public awareness activities. These included distributing flyers, posters, brochures, and newsletters; organizing field trips and study tours; conducting art festivals and competitions on the environment; incorporating environment-related themes into school activities; conducting interviews and talk shows; organizing radio and TV shows, among others.

Some examples that showed the effectiveness of the public awareness programs at the selected ICM site are given in *Box 4*. The case examples illustrated that an effective IEC campaign, which drew attention to an issue, motivated the public to take action and influence policymaking and management decisions.

Financing mechanisms

ICM programs can be initiated within the limits of available budgets of the national and local governments. External budgetary contribution from other sources such as grants/donor projects, co-financing by private sector partners, user fee and permit system, among others, can accelerate and enhance ICM program development and implementation.

National ICM demonstration sites received partial financial support from GEF during the implementation of the first phase of the ICM program while other ICM sites utilized government budget with contributions from various sources

Box 4. Some examples of public awareness programs and impacts at selected ICM sites.

- **Bataan (Philippines)** conducts annual coastal cleanup in observance of the International Coastal Cleanup Day. The activity has attracted thousands of volunteers since it was started in 1999. Results were reported to the mayors, municipal planning officers and barangays (villages) for appropriate management actions to address the solid waste problem. The coastline covered by the activity increased over the past ten years while the volume of trash collected has been decreasing.
- **Bali (Indonesia)** integrated the “Tri Hita Karana” philosophy, which emphasizes on practices that maintain a harmonious relationship among Man, the Environment and God, into the ICM program. Among the positive effects that resulted from the public awareness campaign to preserve and conserve the coastal and marine resources included the engagement of the hotels in good environmental practices and the establishment of the Tri Hita Karana Awards for Tourism, which was endorsed by the UN World Tourism Organization in 2004.
- **Da Nang (Viet Nam)** established a Network of Communicators, which provided assistance in the implementation of public awareness activities and in mobilizing stakeholder involvement in various activities of the ICM program, including the conduct of training and education for the civil society groups. The participation of the Women’s Association, Farmer’s Association and the Danang Youth Union, in public awareness drives has generated positive results. A survey conducted during the height of the demonstration project showed that about 85 percent of households located in 30 communes in Danang are committed to protecting the environment (Minh and Bermas, 2004).
- **Xiamen (PR China)** illustrated the power of an informed public with the rejection by them of the establishment within the city of a mega petro-chemical plant that was approved by national government. The public has been educated about the environmental and public health aspects arising from the toxic effects of petrochemical wastes. Through persistent rally and public protests over an extended period, the plant was eventually relocated outside Xiamen.

including the private sector, to develop and implement their ICM programs. Local financing accounted for more than 95 percent of the total budget, which indicated the interest and commitment among local governments for ICM implementation (Chua, 2015).

Regardless of the economic status of the ICM sites, budget was allocated for the ICM program. As part of the institutionalization of the ICM program, the mainstreaming of the coastal strategy/SEMP into the development plans of the local governments guaranteed the provision of budget and human resources to sustain the program, as evidenced by the experiences of the eight sites.

Xiamen’s investment of RMB 55.7 million (US\$ 7 million) for the development and implementation of the ICM program from 1994-2001 was 86.3 percent of the total budget cost of RMB 64.3 million (US\$ 8 million), a ratio of 6.4:1 (PEMSEA, 2006b). After the first phase, the cost for ICM implementation became fully covered by the Xiamen government. For Batangas (Philippines), annual allocation for the PG-ENRO increased four-fold from 1996 to 2008, which covered the operations of the office and the implementation of special environmental projects. A separate budget was allotted for other sectors, such as agriculture, safe water supply, and sanitation and health. Other sources of financing were grants from other partners such as the First

Philippine Conservation, Inc., Batangas Coastal Resources Management Foundation, Conservation International-Philippines, and World Wide Fund for Nature (WWF)-Philippines.

ICM also catalyzed investments from private sources to finance ICM program activities, particularly environmental improvement projects (PEMSEA, 2015a). The ICM program created an enabling environment conducive for pooling of public and private resources. Through the coastal strategy prioritization process, potential environmental improvement projects were identified collectively by the stakeholders. Opportunities were identified where the private and corporate sector could participate in ICM program implementation.

In Bataan (Philippines), for example, an effective public and private sector partnership arrangement was established. Eighteen industries operating in the province set up the Bataan Coastal Care Foundation, Inc. (BCCFI). It provided counterpart funding to the ICM program, sponsorship for community-based projects, and technical assistance; served as an active member of the Bataan Sustainable Development Council; and participated in consultations that led to policy reforms and in IEC campaigns. The members of BCCFI were also fully involved in the planning and operation of the project in close cooperation with the provincial and municipal governments. The close involvement of BCCFI was attributed to the fact that they understood their role in improving local governance. There was also complementation of their advocacy to the strategic direction of the province for sustainable development that led to positive results in social, ecological, and economic attributes. They were part of the institutionalization process, which provided opportunities for the private sector to have a voice in local coastal governance. Nevertheless, challenges remained in terms of sustaining the interest and commitment of all of the BCCFI members. The regular conduct of fellowships to apprise the members of the

achievements, issues, and emerging concerns was key to keeping the members continuously engaged.

Since the implementation of strategic action programs requires substantial financial resources, such funding needs to be provided by the government through regular budgetary allocations or loans or through other financing systems such as direct private sector investments or public-private sector partnership (PPP) arrangements. In PR China, the Ministry of Finance issued a circular in September 2014 promoting PPPs in pollution reduction and energy conservation. The policy facilitated investment of about US\$ 6.5 billion in over 130 projects for wastewater treatment and solid waste management and for building and operating waste-to-energy power plants (PEMSEA, 2015b).

Capacity development

Building and strengthening local capacity is an integral part of ICM program implementation. Investing in local capacity development to strengthen local government's ability to use effective planning and management tools and increase their knowledge in undertaking policy reforms for sustainable development of the coastal and marine areas under their jurisdiction was imperative, in view of the anticipated expansion of ICM practices across the region and beyond.

The success of many ICM sites was attributed to the availability of human and institutional capacities, which were instrumental in effectively utilizing interdisciplinary and local knowledge in the development and implementation of the long and medium-term strategic action plans. ICM projects involved working with a diverse set of stakeholder groups ranging from policymakers, government officials, local communities, private sector, academe, and NGO and community-based organizations. Various technical and managerial skills were needed in executing an ICM program. In addition to knowledge and techniques acquired

from conventional educational institutions, ICM practitioners needed on-the-ground experience and the necessary management skills in order to implement and manage such complicated programs. The ICM sites demonstrated that many local coastal managers and technical experts were trained through direct participation in the early phase of initiating, planning, and executing various activities of the program. As such, capacity building was emphasized as an important core element of governance. The selection of appropriate local officials as part of the ICM team was important since they need to acquire and develop skills necessary for a coastal manager (e.g., possesses broad, multidisciplinary knowledge and problem solving and people management skills; and is a strategic thinker, persuasive, and communicative, among others).

The ICM sites effectively served as training laboratories, which facilitated learning-by-doing among the local leaders and practitioners. They served as preferred sites for cross-learning and study tours, facilitating learning-by-seeing among the participants. Each of the ICM sites has its own unique characteristics and focus areas to showcase, making it a suitable learning site for interested local governments and entities with similar management issues and conditions. For example, Bali (Indonesia) showcased habitat protection and biodiversity conservation; Batangas (Philippines), marine protected area management and networking; Xiamen (PR China), sea use zoning implementation and compliance monitoring; Chonburi (Thailand), integrated coastal erosion management; Sihanoukville (Cambodia), solid waste management; and Da Nang (Viet Nam), sustainable coastal tourism development and beach management.

A critical outcome of the capacity development efforts, which were in conjunction with ICM implementation, was the creation of practitioners and managers with the ability to integrate, coordinate, facilitate, mediate, and negotiate with

political leaders and stakeholders. Such expertise or skills were made possible through practical exposure to ICM implementation over a long period of time. The engagement of institutions, such as government agencies, research and educational institutions in implementation developed institutional capacity. When taken together, the strengthened human and institutional capacities guaranteed the sustainability of ICM programs (Chua, 2015).

Through the years, the number of individuals exposed to ICM significantly increased, which was critical in meeting the demands for ICM scaling up.

Lessons Learned

ICM is a complex management undertaking. Its effectiveness and viability are limited by challenges in governance. The preceding facts have established that the six core governance elements are indeed necessary, justifiable, and doable within varying social, economic, cultural, ecological, and political settings that characterize the ICM sites. Each core element plays a significant and mutually reinforcing role in the governance process, thus providing a strong foundation for ICM practice. A good ICM program is built upon a common or shared vision, science-based, facilitated by policy and legislation, supported by stakeholders, and managed and implemented within the limits of local capacity.

The levels of achievement of ICM practices vary in all cases. Adaptive management, a guiding principle of ICM practice, was utilized in adjusting and responding to common challenges and uncertainties brought about by: (a) policy changes and political interventions; (b) changes in public opinion and varying responses of stakeholders to management interventions; (c) emerging concerns like climate change and sea level rise; (d) development directions of national and local governments; and (e) commitments to regional

and global agreements and instruments such as Agenda 21, WSSD POI, the Future We Want, SDGs, and the SDS-SEA. Appropriate measures were also undertaken in response to specific challenges related to limited: (a) interagency cooperation; (b) human and institutional capacity; (c) access to scientific information and data; and (d) financial resources. Such adaptation to management practices was made possible through modifications facilitated by the essential elements of governance.

Each ICM site has its own unique attributes and strengths that make it an ideal site for cross-learning and site visits to facilitate the transfer of knowledge and experiences in ICM implementation. A critical mass of coastal managers and ICM experts in the region was developed over the years through this process.

Effective coastal governance ensures timely delivery of outputs and expected outcomes. Its effectiveness and socioeconomic benefits need to be measured and demonstrated in all ICM sites to convince national and subnational governments to develop and adopt the needed coastal/ocean policies or legislations in support of ICM practices, their scaling up, and investments. The Xiamen example showed the benefits derived from the environmental improvement efforts, particularly the Yuan Dang Lagoon cleanup, which motivated the Xiamen government to embark on a similar cleanup project in Maluan Bay in view of the economic incentives. The cleanup effort in Maluan Bay was expected to generate an investment close to US\$ 1 billion, similar to that of Yuan Dang Lagoon which generated substantive social, environmental, and economic benefits (PEMSEA, 2006b).

The positive impacts of ICM practices enhanced the mainstreaming of the key governance elements and the ICM approach into the local governance system in achieving sustainable coastal development. The paradigm shift in coastal governance was shown to be useful and effective by the eight ICM sites and other follow-on ICM initiatives in the region.

“Coming together is a beginning; keeping together is progress; working together is a success.”

Henry Ford

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The Effective Role of Dongying Interagency Coordinating Mechanism for Implementing Integrated Coastal Management Program

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Key Message

- An interagency coordinating mechanism is critical in the course of developing and implementing an integrated coastal management (ICM) program. The mechanism's effectiveness very much depends on its composition, terms of reference, leadership, and interagency participation in addressing the management complexity of coastal areas.

Abstract

As the marine economy of Dongying City accelerated, the traditional sector and issue-oriented management practices needed improvement. The Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) provided an opportunity to Dongying City to learn and initiate ICM practices. Over the past ten years, the government effectively

established an ICM Committee, an interagency cooperation and collaboration mechanism to address sustainable development concerns of its coastal and marine resources. The committee, comprising 16 departments, prepared coordinated development plans for land and sea and advanced the marine economy by strengthening the administrative capacity of Dongying City in addressing coastal development challenges. Under the structure of the ICM committee, all the stakeholders could raise their management concerns, express their opinions, and forge agreements among themselves. With the help of the ICM Committee, decisionmaking on interdepartmental issues and project implementation were facilitated more efficiently. During the past years, some projects were designed and successfully implemented, such as the Guangli River Pollution Reduction Project, the Integrated Coastal Management Plan of Dongying City and its State of the Coast (SOC) Report.

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Background

In 2005, Dongying City joined the GEF/UNDP/PEMSEA Project on the Implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA) as a parallel site to develop and implement an ICM program with the goal of balancing economic development and environmental conservation as well as sustainable use of marine resources.

Dongying's efforts in the planning and management of its coastal areas and adjacent waters benefitted from the experience and working modality of Xiamen's ICM demonstration project (Hong, 2006). For the purpose of ensuring effectiveness in the implementation of the ICM program, the city government, following the example of Xiamen City, established an interagency coordinating mechanism to facilitate and coordinate the development and implementation of its ICM program.

Like most coastal cities or municipalities, Dongying City was relatively new to integrated planning and management, especially the challenges of interagency coordination of sector policy and agency functions in achieving a common vision. Of special importance was the leadership role of the Ocean and Fishery Bureau (OFB) vis-à-vis several other ocean-related line agencies. Of equal importance was the challenge of involving nongovernment sectors and communities.

Over a span of ten years, Dongying City successfully implemented various ICM-related projects/activities. The coordinating mechanism continued to play a predominant role in guiding the coastal and marine related activities towards sustainable development goals. This case study focuses on the formation of the coordinating mechanism, its key roles, activities undertaken, impacts, and obstacles confronted during the course of ICM program development and implementation in Dongying City, especially on

the leadership role of the lead agency and the coordinating mechanism in addressing challenges. Major lessons are distilled from practical experience.

Approach and Methodology

The Ocean and Fishery Bureau (OFB) of Dongying City has management responsibility for mineral and oil extractions, as well as other natural resource use activities such as fishery and aquatic farming, which involve a large sector of the coastal communities. OFB plays a key role in ensuring the sustainable use of the coastal and marine natural resources within its administrative boundary (Box 1). Like many coastal cities and municipalities in the country, management challenges in the coastal area include: (a) conflicts arising from multiple uses of the coastal and marine resources; (b) overlapping responsibilities and competing budgetary allocation among several concerned agencies; (c) lack of clear policy direction; (d) coastal management challenges; (e) lack of political will; and (f) lack of capacity to undertake ICM.

Since the major purpose of the ICM project in Dongying City was to verify the ICM working methodology developed in Xiamen, the project received the endorsement of relevant authorities from the central and local governments. One of the important steps in successful ICM program was to ensure the establishment and functioning of an interagency coordinating mechanism. Such mechanism served as the key driver in facilitating strong government commitment in terms of human and financial resources and in promoting interagency collaboration and stakeholders' involvement, especially in minimizing interagency conflicts. Following the working example of Xiamen and PEMSEA's guidelines, OFB facilitated the establishment of a coordinating mechanism by securing the endorsement of concerned agencies and the approval of the local authority.

Box 1. Key functions of OFB.

- Formulate and organize the implementation of ocean and fishery economic development plans and policies.
- Monitor and evaluate marine economy and release information.
- Maintain the regulation of marine and inhabited island use as well as the island ecology.
- Protect the marine environment and eco-environment of fisheries area.
- Formulate and organize the implementation of policy measures in promoting fisheries industry.
- Develop marine disaster warning and fishery's disaster prevention and reduction plans.
- Supervise and manage the quality and security of aquatic products.
- Formulate and organize the implementation of the development planning of ocean and fishery science and technology.
- Conduct research on advanced and application technology in ocean and fishery, transfer the achievements, and popularize the technology.
- Formulate and organize the implementation of standards and technical manuals related to ocean and fishery.
- Promote external economic and technological cooperation and exchanges.
- Conduct marine monitoring, fishing boats inspection and supervision of fishery policies and fishing ports.
- Undertake other tasks assigned by the municipal party committee and municipal government.

An interagency coordinating mechanism is an essential institutional arrangement in the form of a committee or council that should be established in the early phase of setting up an ICM program. Before its establishment, marine-related agencies of Dongying City planned and managed coastal and marine affairs separately. During the implementation of the third phase of the PEMSEA

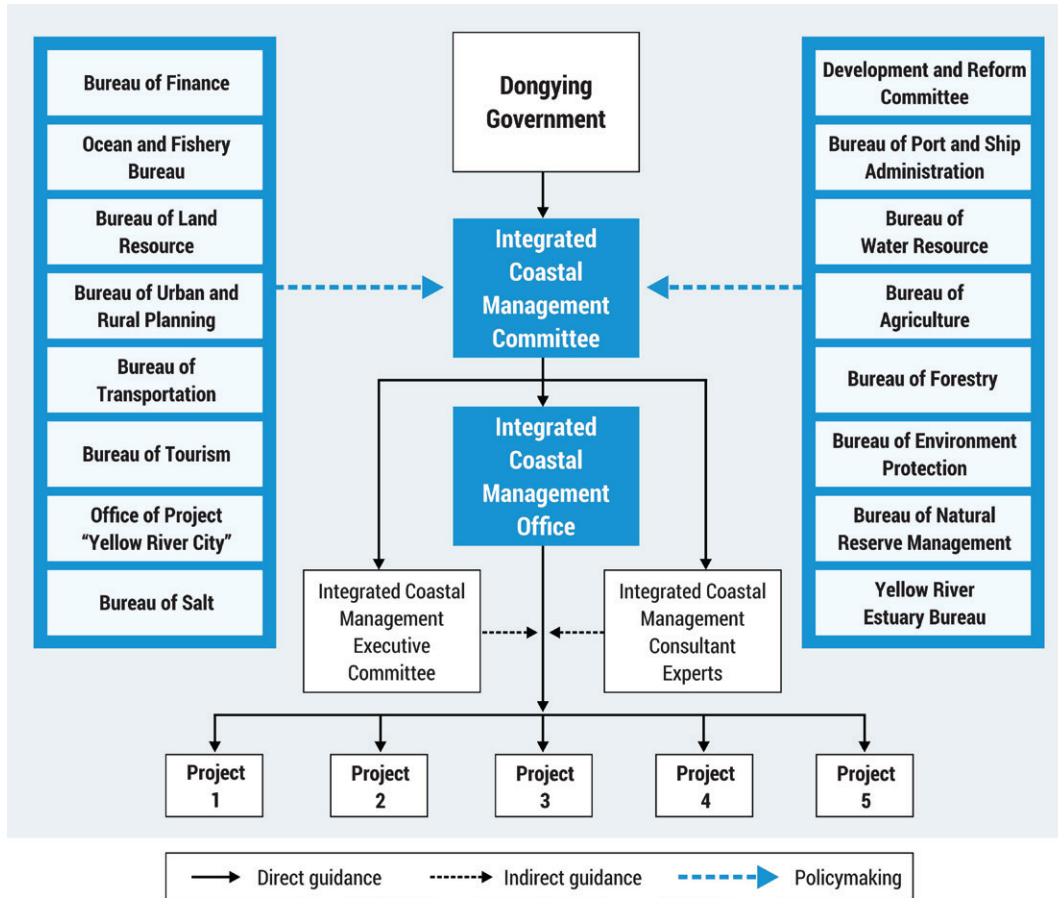
program and with the guidance of the National Task Force (NTF), Dongying City established its interagency coordinating committee in 2010. The ICM Committee was composed of 16 agencies as shown in [Box 2](#).

The vice mayor of Dongying City served as the chair of the ICM Committee, while the directors or deputy/vice directors of concerned agencies served as members, thus ensuring a high-level policy and management decision body to coordinate, direct, support, and review the planning and implementation of various stages of the ICM program. The committee also served as a platform for consultation wherein concerned agencies expressed their views, needs, grievances, and recommendations related to coastal and marine affairs. Such coordinating mechanism was expected to effectively eliminate or reduce interagency or sector conflicts; reduce inefficient use of financial resources; and promote interagency cooperation towards achieving cost-effectiveness.

Box 2. Agencies of the Dongying ICM Committee.

1. Bureau of Agriculture
2. Bureau of Environment Protection
3. Bureau of Finance
4. Bureau of Forestry
5. Bureau of Land Resource
6. Bureau of Natural Reserve Management
7. Bureau of Port and Ship Administration
8. Bureau of Salt
9. Bureau of Tourism
10. Bureau of Transportation
11. Bureau of Urban and Rural Planning
12. Bureau of Water Resource
13. Development and Reform Committee
14. Management Office of Project "Yellow River City" (recovery and protection of Guangli River)
15. Ocean and Fishery Bureau
16. Yellow River Estuary Bureau of Yellow River Conservancy Commission (YRCC).

Figure 1. The ICM Committee of Dongying City.



The structure of the ICM Committee is shown in Figure 1. The local government established the ICM Committee with members from concerned agencies, representatives from the State Ocean Administration (SOA), and PEMSEA to provide advisory support during the early phase of implementation. The OFB served as the lead agency for the ICM program and hosted the ICM Office.

The day-to-day operation was the function of the ICM Office, which executed decisions of the ICM Committee. An ICM Executive Subcommittee was also established to provide implementation guidance to the ICM Office with an ICM experts group providing technical advice. The Executive Subcommittee, chaired by OFB, provided guidance

and direction on the implementation of the ICM program, while the ICM experts group, composed of selected multidisciplinary senior experts, provided the needed scientific advice for the development of management measures.

The ICM Committee held periodic meetings to discuss and decide on the establishment of a common vision and mission, development of strategies and action plans as well as policy and budgetary concerns. The committee also addressed issues emanating from concerned member agencies. When a special meeting was needed, the Executive Subcommittee would request the municipal government to organize an ICM Committee meeting.

Results

Major achievements

1. **The ICM plan.** Through the efforts of the ICM Office, a long-term city government-funded ICM Plan (2010–2020) was finally developed and adopted by the ICM Committee. The plan served as a guide for Dongying City for the sustainable management of its coastal and marine areas, by ensuring sustainable use of coastal and marine resources, promoting sustainable industrial and agricultural development, and protecting the functional integrity of the ecosystems. A common vision for the sustainable development of the coastal and marine areas was agreed upon as a guide for strategic planning.

All the relevant agencies were able to participate in the preparation of the plans, which took into consideration their concerns and proposals. Before the plans were developed, a comprehensive analysis of the state of the coastal and marine areas in Dongying City was undertaken to identify socioeconomic and environmental concerns, policy and management deficiencies, information gaps, and the design of holistic action plans (Dongying Government, 2003; OFD, 2004; OFB, 2007a-f; EPB, 2010b).

The management plans focused on the following:

- a. **Capacity building.** The committee placed much importance on building the necessary improved local institutional ICM capacity for the implementation of coastal strategy and action plans, and the capacity of the ICM coordinating mechanism, and strengthening laws and regulations and their enforcement.
- b. **Disaster management.** The committee secured government approval and support in establishing the necessary infrastructure for disaster prevention and reduction: a coastal disaster forecast system, a coastal disaster emergency response system, and an oil spills preparedness and response system (Dongying Government, 2009; OFB, 2014).
- c. **Environment management.** The committee supervised the review, evaluation and updating of the environmental situation: evaluation of the impacts of the coastal industry; prevention and control of pollution from land; recovery of environmentally degraded coastal areas; and establishment of an environment monitoring and management system (OFB, 2007b; EPB, 2010a).
- d. **Natural resource management.** The committee coordinated the conservation and restoration of important habitats including biodiversity and the development of sustainable fishery and aquaculture (EPB, 1994; OFB, 1997; LRB, 2012).
- e. **Technological and scientific support.** The committee supported the establishment of a coastal monitoring network and initiatives in carrying capacity assessment of coastal areas; assessment of ICM effectiveness; and establishment of a GIS for coastal areas (STB, 2007).
- f. **International cooperation and exchanges.** The committee endorsed and promoted international cooperation and information exchange to share experiences and lessons with other ICM initiatives in the country and abroad.
- g. **Public awareness and education.** The committee promoted public environmental

awareness, encouraged activities involving volunteers for environmental protection, and strengthened environmental education for school students.

2. Guangli River Pollution Reduction Project.

The Guangli River Project was one of the success stories of Dongying City. Guangli River originates from the northern Kenli district, passing southeast through the central part of Dongying City. Before 2010, the river received most of the domestic sewage of the city, which heavily polluted the river. The river water was foul, stank, and certainly not suitable for aquatic wildlife. The city government included Guangli River improvement as a priority project of the ICM program. Through its implementation, the sources of key pollutants were identified by experts with the support of various agencies. The project also set the water quality target and then developed a comprehensive action plan for pollutant

reduction. Funding was made available through the central and local governments. The key project activities included:

- a. Infrastructure development for pollutant treatment – sewage interception and collection, expansion of sewage treatment and related supporting facilities, channel cleanup and improvement of source water.
- b. Pollutant emission reduction – control of pollutants from industries and nonpoint sources.
- c. Ecological restoration, management and landscaping – restoration of wetlands, greening and landscape improvement.

Over the last ten years, the water quality of Guangli River gradually improved and was able to meet the approved water quality standards. Fish and bird populations in the river have reportedly increased (Figure 2; EPB, 2005; EPB, 2010a; Sina, 2013; Dazhong, 2015). There were

Figure 2. Guangli River after the Pollution Reduction Project.

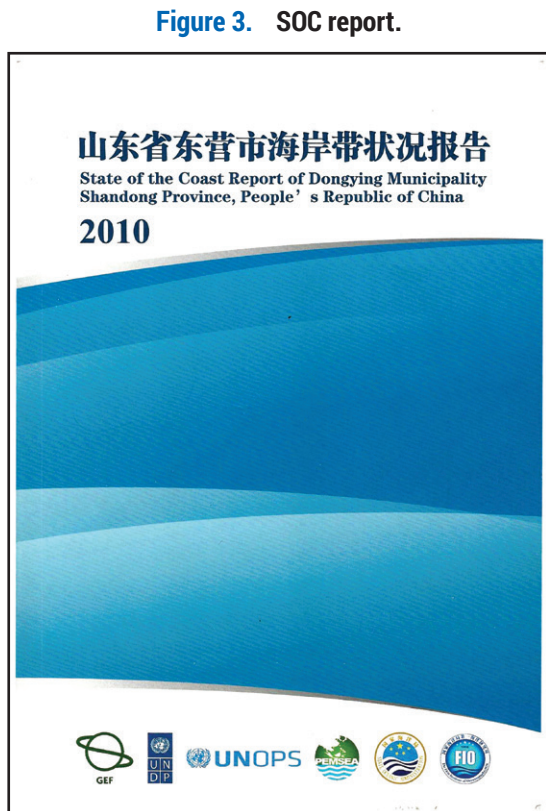


more recreational parks being created for the local residents because of the greening and landscaping.

3. **SOC Report.** The SOC is a comprehensive reporting system (Figure 3) which identifies the changes in socioeconomic and environmental conditions arising from policy and management interventions in a given coastal area (generally within the administrative boundary of the local government). It is based on a series of performance indicators. The SOC is meant to take stock of the outputs and outcomes against inputs arising from the implementation of the ICM program and to identify weaknesses, gaps, and deficiencies for improvement. It also helps to enable policymakers and managers to assess the effectiveness and impacts of their investments.

Upon the recommendation of the ICM Committee, the city government decided to prepare and release the SOC report to measure its performance on the self-funded ICM program.

A working group for the SOC report was established under the supervision and guidance of the ICM Committee. Using PEMSEA's SOC Guidebook, the working group collected data and information with the cooperation and support from line agencies and technical advice from the Technical Experts Group. Most performance indicators in the guidebook were followed except a few which were modified in consideration of the specific prevailing conditions.



Many oil wells and production plants are located in Dongying City. As such, the petroleum industry plays a significant role for both national and local economy. Thus, a new indicator, "Oil pollution ratio of coastal area" was added to the indicator system. A total of 32 performance indicators were selected to identify the trends from 2005 to 2010, of which 13 were related to coastal governance and another 20 related to sustainable development aspects such as natural disaster prevention and management, ecosystem and biodiversity conservation and management, pollution, fisheries and aquaculture, etc. (Liu, 2012).

Figure 4. A summary of outcomes of the Dongying SOC report (2010).

Table 1: Coastal Governance			
Policy and rules	Indicator 1	Local policy and rules	3
	Indicator 2	Law force	3
Strategy and plans	Indicator 3	Regional strategy and plans	3
	Indicator 4	Local strategy and plans	3
Institution and mechanism	Indicator 5	Institution for ICM	3
	Indicator 6	Coordination mechanism for ICM	1
Financial support	Indicator 7	Management fund	3
	Indicator 8	Sustainable financial resource	3
Management capability	Indicator 9	Hardware construction	3
	Indicator 10	Software construction	3
Public participation	Indicator 11	Public awareness	3
	Indicator 12	Participation of stake-holders	3

Table 2: Sustainable Development Aspect			
Social-economy sustainability	Indicator 13	Population and economy density	3
	Indicator 14	Contribution of oceanic industry in GDP	3
	Indicator 15	Livelihood Input	3
	Indicator 16	Environmental monitoring system	3

Environmental support capability	Indicator 17	Pollution load to sea water	1	
	Indicator 18	Coastal sea water quality	1	
	Indicator 19	Benthic biodiversity	1	
	Indicator 20	Environmental management measures for coastal area	3	
	Indicator 21	Ratio of incorporation of environmental protection investment over GDP	1	
	Indicator 22	Oil pollution ratio of coastal area	3	
	Indicator 23	Available sea area	3	
	Indicator 24	Available coastline	1	
	Indicator 25	Renewable energy	1	
	Resource sustainability	Indicator 26	Seafood supply	3
		Indicator 27	Natural wetland area	1
		Indicator 28	Management measures for coastal resources	3
Indicator 29		Construction and management of marine protected network	3	
Disaster prevention	Indicator 30	Risk management consciousness	1	
	Indicator 31	Social economic loss due to disasters	1	
	Indicator 32	Disaster prevention capability	3	

The summary of outcomes of the SOC report are presented in [Figure 4](#).

The SOC report was evaluated by the Technical Experts Group and PEMSEA, and published in 2012. It was the first time that the city government undertook such a comprehensive assessment of its management measures. The performance indicators allowed it to track the socioeconomic and environmental impacts, trends, and deficiencies to further improve its adaptive management measures. Being one of the ICM sites in East Asia, Dongying's SOC served as a working model for ICM reporting that can be compared to those ICM practices in China and the region at large.

Lessons Learned

Much was learned from the ICM program during the first five years (2005–2010) of implementation. Considerable achievements were made in terms of improving governance and achieving on-the-

ground changes through the implementation of environmental activities. Throughout the ICM planning and implementation process, the ICM Committee played a key role, particularly, in the following areas:

1. **Forging strong commitment and support of the local government.** The leadership of the Dongying City government gave much needed policy and financial support to enable the implementation of the ICM program, especially when it was locally funded and implemented by local human resources with marginal international technical or financial support. As such, strong political commitment was critical for ensuring smooth implementation of many planned projects especially those requiring substantial financial investments.
2. **Encouraging active involvement and collaboration of the relevant agencies throughout the ICM cycle.** Such endorsement from the ICM Committee, in part, contributed to strengthening interagency cooperation. The

willingness to cooperate was also attributed to the following:

- a. The common vision of the coastal strategy for the development of the ICM program and the agreed collective mission in achieving sustainable development objectives;
- b. The availability of a common platform for resolution of interagency and sectoral conflicts. As such, the concerned agencies benefited from negotiation, clarification and dialogues in case of disputes; and
- c. Visible outputs and outcomes arising from the implementation of the ICM program increased confidence, appreciation, and support from participating agencies, stakeholders and the general public. The ICM initiatives increased public involvement in city building, which was further enhanced by honorary awards bestowed to Dongying City, such as the “National Civilized City,” “National Demonstration City for Environmental Protection,” “National Experimental Area for Sustainable Development,” and “China Excellent Tourism City”.

Over a span of ten years, Dongying City diligently implemented ICM programs and achieved remarkable results. It contributed to the GDP growth of the city. From 2009 to 2014, Dongying’s GDP increased from RMB 205.9 billion to RMB 343.1 billion, with an average growth rate of slightly more than ten percent. Another benefit was the development of management and technical capacities at all levels of governance, especially those involved in the implementation of the ICM programs, through “learning by doing” and available training opportunities and exchange programs. Members of the ICM Committee benefited from increasing knowledge and experience in managing the complexity

of the coastal areas and more importantly, in appreciating the value of working together.

Some major challenges to the sustainability and efficiency of the coordinating mechanism were encountered. But as the experiences of the ICM Committee matured, these were addressed in due course:

1. The changes of leaders and key members of the ICM Committee could influence the coordinating efficiency, performance and stability;
2. The ICM Committee was initially operating as a temporary mechanism with ad hoc meeting schedules based on specific needs. Eventually the committee became a permanent mechanism of local government; and
3. The ICM Committee initially did not clearly define its area of coverage and responsibilities, which caused uneasiness in interagency cooperation, budgetary allocation, etc. Terms of reference and scope and areas of coverage were identified and adopted by the committee members.

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Integrated Coastal Management Coordinating Mechanism for Da Nang City

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Key Message

- Coordination is an indispensable element of an integrated coastal management (ICM) program. The setting up of a Project Coordinating Committee (PCC) by a responsible authority at project inception creates a favorable environment for ICM implementation and is crucial to ICM success.
- The coordinating mechanism, as demonstrated in Da Nang City, can provide the necessary platform for stakeholders to interact and make collective decisions on sustainable development and ICM program implementation challenges. This can result in reduced policy and functional conflicts between sectors and government agencies pertaining to use of the coastal and marine areas.

Abstract

Da Nang City's coastal area is experiencing high economic growth, particularly for coastal tourism, port development, and maritime transport. Under a sectoral and "territory-based" management, unintegrated development was resulting in coastal use conflicts and generating various environmental concerns including pollution, degradation of coastal resource-base, and habitat destruction. The city government, in its pursuit for sustainable development, adopted the ICM system in 2000, under which a multidisciplinary coordinating mechanism was established, and institutionalized. Through this mechanism, the city mobilized the active participation of various stakeholders. Issues concerning coastal and marine resource use, as well as the city's plans for socioeconomic development, were thoroughly discussed

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during stakeholder consultations, workshops, and meetings. The consensus-building process of the ICM approach helped reduce use and turf conflicts between sectors and agencies. This, in turn, facilitated the city government's coastal planning and decisionmaking processes.

The multidisciplinary coordinating mechanism, one of the main dynamics of ICM, played a key role. Stakeholders were appreciative of the mechanism because they benefitted from the outcomes. Its effectiveness and the experiences gained during the development and implementation of the ICM program strengthened the capacity of Da Nang City in implementing other related projects and programs, such as the Provincial Program in Response to Climate Change and Sea Level Rise, which required multisectoral and multidisciplinary coordination and cooperation.

Background

In the past two decades, Da Nang, a coastal city in Viet Nam, experienced rapid and dynamic economic growth and social development. Because of its strategic location, Da Nang city played an important role in promoting the development of its coastal areas — port, tourism, shipping, fishing, aquaculture, mining, urban, and residential development. Similar to other coastal provinces of Viet Nam, development activities in Da Nang City were employing sectoral and “territory-based” management approaches. As a result, the coastal space and resources were used by different sectors in a disorderly manner. This generated many coastal environmental challenges, including pollution, degradation of resource base, habitat loss, and hence, loss of ecosystem services. As the city's development focused on the marine economy, in particular coastal tourism, port development, and maritime transport, there was an urgent need for a more efficient and effective environment and natural resource management approach to ensure sustainable exploitation and use of the marine and coastal resources. The ICM

system was introduced in Da Nang in 2000 by the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) as an environmental management approach in achieving social, economic and environmental sustainability.

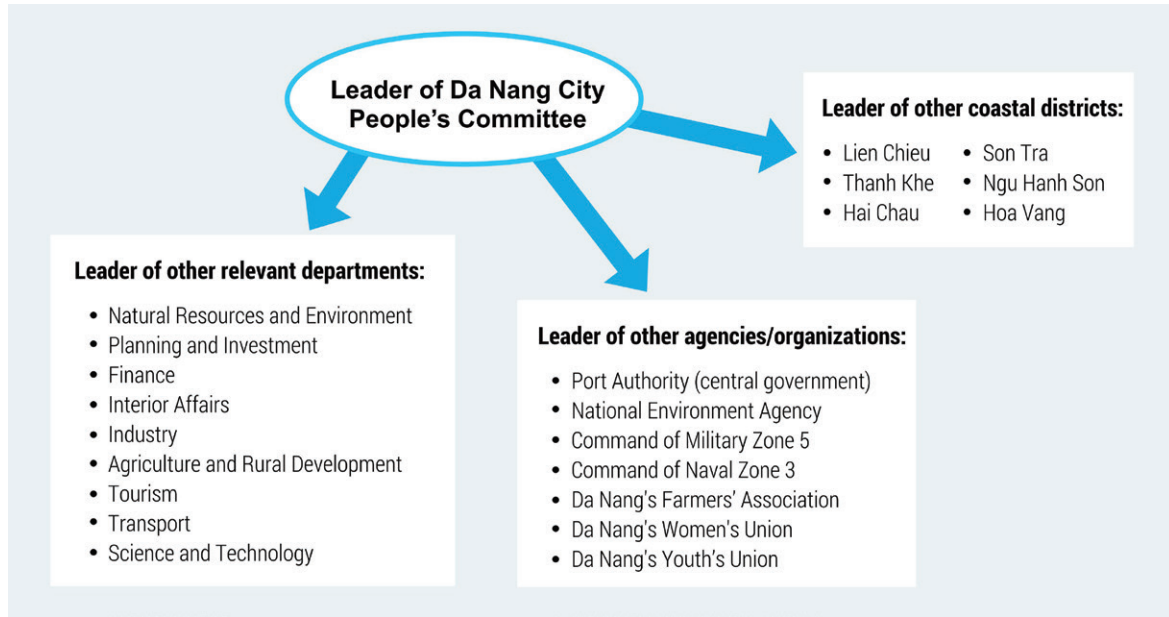
The project started with the establishment of a multidisciplinary coordinating committee, a mechanism which engaged key stakeholders with clearly defined functions and responsibilities (Figure 1). Through such coordinating mechanism, the city mobilized the active participation of various stakeholders throughout project implementation. The coordinating mechanism played a key role in promoting effective integrated management of the coastal and marine resources. The stakeholders appreciated the establishment of such mechanism because they benefitted from the outcomes of the project, which were crucial for the city in achieving sustainable development goals, especially towards its transformation to an “Environmental City” by 2020.

This case study documents the establishment and functions of a multidisciplinary coordinating mechanism and how it was sustained.

Approach and Methodology

To effectively implement the national ICM demonstration project, the city established a PCC based on Decision No. 7997/QD-UB, dated 5 July 2000, by the People's Committee of Da Nang City. The PCC consisted of 25 members and chaired by a vice chair of the People's Committee of the City. The PCC deputy chair, with a key role in project implementation, was the director of the Department of Natural Resources and Environment (DONRE). Other members of the PCC included leaders of the People's Committee of Da Nang City, the People's Committees of coastal districts, the leaders of key departments, agencies and organizations, and a representative of PEMSEA's national focal agency, the Viet Nam Environment Protection Agency

Figure 1. Multidisciplinary coordinating mechanism under the Da Nang ICM Project.



(then under the Ministry of Science, Technology, and Environment). The PCC members also included representatives from the Port Authority, the Command of Military Zone 5, the Command of Naval Zone 3, Da Nang's Farmers' Association, Women's Union, and Youth's Union (Figure 2).

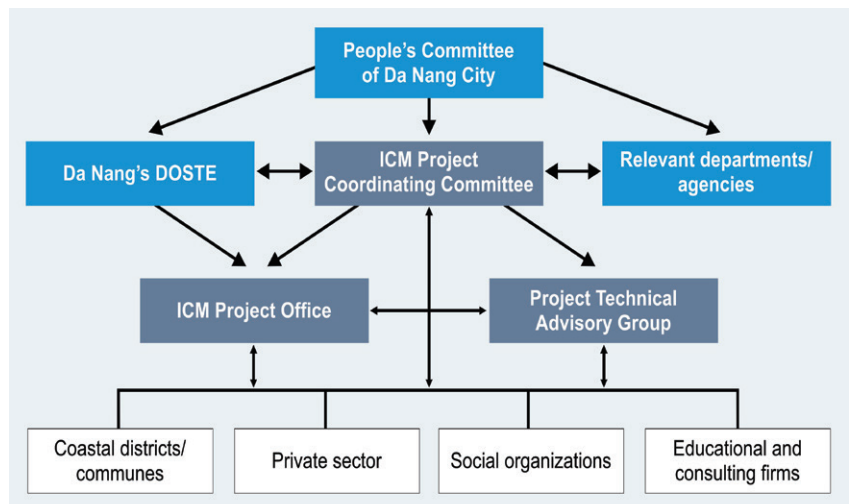
The PCC conducted quarterly meetings to review the project's activities and outputs as well as to identify and recommend effective solutions for addressing environmental and developmental concerns or constraints encountered during project implementation. The meetings provided the necessary forum for the stakeholders to discuss their concerns and to agree on decisions for their resolutions, thus reducing conflicts between and among sectors.

All members of PCC worked on a part-time basis. There was no allocated funding for the committee's regular activities or extra financial support for their participation. Members' costs were shouldered by their respective organizations. Shortly after the project was

officially started, the PCC was able to operate smoothly, especially creating unity across all relevant agencies. The stakeholders realized the importance of their roles and responsibilities, and were motivated to actively participate in project activities including identifying solutions and measures for effective project operation.

Assisting the PCC was the Project Management Office (PMO). It consisted of permanent and several part-time staff of the then Department of Science and Technology. All PMO staff were

Figure 2. Composition of PCC members.



selected based on the terms of reference of their respective working positions. Thus, the PMO could handle and complete many different and challenging tasks of the project, including working directly with international experts.

The close cooperation among the relevant departments, agencies and other stakeholders created a significant change in the perception of people and officers on protecting and maintaining natural resources. Many government managers from different departments were interested in the approach and outcomes of the ICM project and incorporated them into their agencies' agenda. The public being appreciative of the initiatives, was motivated to actively participate in the project activities, especially those related to coastal environment and resource protection. Their participation contributed much to the development of Da Nang into an environment-friendly city, in particular, the development of a long-term city vision as outlined in Da Nang's Coastal Strategy (Box 1).

The active participation of the concerned departments/agencies and districts, and social organizations in the coordinating committee reflected their understanding and acceptance of the ICM approach in protecting the values and benefits of coastal and marine natural resources.

The interest and active participation of stakeholders in the coordinating mechanism, which is based on fairness and democracy, also facilitated the mobilization of human resources. Stakeholders realized the benefits, particularly in solving conflicting issues related to the coastal area and promoting multidisciplinary cooperation and integration.

The issues on coastal and marine resource use in relation to the city's socioeconomic development plans were also discussed during stakeholder consultations, workshops, and meetings. The consensus-building process helped reduce conflicts

Box 1. Vision of Da Nang City.

A coastal area of rapid and diversified development, with green, clean, beautiful, and healthy environment; where the natural resource system is under long-term planning and sustainable use; where the ecological, cultural, and historical values are preserved; where the Da Nang people are provided with maximum benefits while the ecological values are maintained, and where Da Nang shall spearhead Viet Nam and the Region towards sustainable development.

**People's Committee of
Da Nang City, 2001**

in coastal resource use, which in turn facilitated the government's planning and decisionmaking processes (Box 2).

The project's training programs supported the coordinating mechanism by creating a network of people with skills and knowledge on ICM. This served as the basis for mainstreaming the ICM model into the programs, plans, and activities of departments and districts in Da Nang.

The experiences gained were also used to implement other activities that required multisectoral and multidisciplinary coordination and cooperation, such as the Provincial Program in Response to Climate Change and Sea Level Rise.

Overcoming operational challenges

Members of PCC were responsible for many other tasks in their respective agencies. Some initially did not fully appreciate the ICM approach or were not able to participate fully in all PCC meetings. To overcome this, a PCC Assisting Group was established, composed of senior technical and administrative staff of the respective departments, agencies, and districts. The PCC Assisting Group was responsible for supporting PCC in

Box 2. Facilitation of planning and decisionmaking processes.

The PCC ensures close coordination and cooperation between and among sectors and governments at different levels; it mobilizes the participation of specialized agencies and institutions, and all stakeholders in project implementation resulting well in program activities being synchronized and smoothly implemented. Relevant programs and development plans of the city related to coastal and marine resources and environmental management have been adjusted based on comments of the departments, district governments and related agencies through wide consultation.

Nguyen Dieu

Former Director of the Department of Natural Resources and Environment of Da Nang City, and Vice Chair of PCC

various activities, such as information gathering and dissemination, report preparation, and coordination between PCC and PMO during the project implementation process. As such, PCC was able to operate smoothly.

When there was a revision in PCC membership due to changes in positions within agencies, the newly appointed members encountered difficulties in understanding the project activities and progress. In 2005 in particular, there were changes to the city's leaders, and several of them were also members of PCC. To fill this gap, the Da Nang's People's Committee promptly issued Decision No. 6207QD-UB, dated 5 August 2005, on the amendment of PCC membership, particularly the designation of new members. The PCC also directed PMO to provide the necessary

materials and information to newly appointed PCC members and to regularly update them and provide clarification of any matter related to the ICM project.

From 2004 to 2005, the project faced significant changes arising from the reorganization of concerned agencies relating to science, technology, environment, and natural resources sectors at both national and local levels. The PCC advised the city's People's Committee to maintain PMO under the Department of Science and Technology (DOST) instead of shifting it to DONRE¹ to avoid any disruption to project implementation, given that the project was in its final stages of the demonstration phase. As soon as this phase was completed in March 2006 and preparations were made to proceed to the next phase, the ICM project was handed over to DONRE. To ensure uninterrupted project performance, the PCC proposed the transfer of all PMO staff from DOST to DONRE to effectively assist the newly appointed PMO director from DONRE. Through the recommendation of the PCC, the People's Committee issued Decision No. 2587/QD-UBND, dated 21 April 2006, on the related PCC membership amendment, especially regarding the new PCC vice chair position assigned to the director of DONRE.

Results

The PMO's role was critical in ensuring that PCC operated smoothly and effectively throughout the whole project implementation process. The PMO, while serving as the PCC Secretariat, also built its capacity on ICM implementation through "learning by doing", particularly in developing plans, managing specific activities of the ICM project, and working with various stakeholders. Through the organization and conduct of seminars, workshops, and training courses, the capacity of PMO staff was

¹ As per government decision, ICM, including its development and implementation, is handled by the natural resources and environment sector.

strengthened and in the process their confidence was boosted in working and interacting with, and mobilizing the various stakeholders. The staff's knowledge and experience continuously accumulated through their involvement in project activities, such as development and implementation of a communication plan, coastal strategy and action plan, coastal use zoning plan, integrated environmental monitoring, integrated information management system, coastal risk assessment, and coastal vulnerability study (Boxes 3 and 4).

Over the span of 15 years, PMO staff became more familiar with the operational details in developing and implementing the ICM project within the Vietnamese sociopolitical and administrative settings particularly in addressing sectoral overlaps and in solving multiple use issues in the coastal areas. The ICM project also provided opportunities for the staff to participate in international events, including giving presentations on the progress made and sharing experiences in ICM implementation. Likewise, as a national ICM demonstration site, Da Nang became a favored venue for regional training and important international events such, as the East Asian Seas Congress in 2015.

The PMO staff were involved in organizing many international and in-country seminars and training courses related to ICM, specifically on the scaling up program in Viet Nam and the ICM for the North-Central and Central Coastal Region of Viet Nam until 2010, with orientation to 2020 (to realize Decision No. 158/2007/QD-TTg of the Prime Minister). These courses included the following:

- Training Workshop on Implementing Decision 158/2007/QD-TTg and the ICM Scaling Up Program for DONRE staff of other coastal provinces of Viet Nam;
- National Training Course on ICM Level 1 for leaders and representatives of DONRE from

Box 3. Capacity building in Da Nang ICM.

The ICM project has brought many benefits in my professional career. Specifically, it made me understand the benefits of integrated management approach to achieve sustainable development, which is very useful for me to carry out various tasks related to the management of the environment and natural resources. My involvement in ICM Project implementation has taught me how to develop and manage projects and plans as well as collect and share data and information with various stakeholders. The project has also provided me the opportunity to improve my ability in preparing and presenting reports.

Phan Thi Thu Thuy

PMO staff of the ICM Project
since 2004

28 coastal provinces, and professional staff from universities and research institutes in Viet Nam, and representatives from the Viet Nam Administration of Seas and Islands;

- Training Course on ICM for leaders of coastal communes and Divisions of Natural Resources and Environment of all districts;
- National Training Workshop on the Development of Coastal Strategy and Communication Plan for ICM for staff from 20 coastal provinces within the framework of the ICM scaling up program for 7 provinces of Viet Nam and the ICM program for 14 central coastal provinces, following Decision No. 158;
- Training course on State of Coast Report Development and Integrated Information Management System development for officials of Quang Nam and Thua Thien Hue Provinces and Da Nang City; and

Box 4. Capacity building in Da Nang ICM.

The ICM project helped me in strengthening my technical capacity in the field of sea and islands management. At the early stages of ICM project implementation, I had the opportunity to learn and apply a GIS technique and develop and manage the database for the Da Nang coastal zone management. Together with what I have gained later, such as teamwork skills and experience in working with various stakeholders, I could participate in and significantly contribute to the development and implementation of some important ICM tools, such as coastal use zoning plan, integrated environmental monitoring program, integrated information management system, and the project web page.

Do Manh Thang

PMO staff of the ICM Project
since 2001

- National Training Workshop on Strengthening capacity for ICM for participants from 28 coastal provinces of Viet Nam.

The PMO staff also shared with staff of other coastal provinces of Viet Nam the results and lessons learned from developing and implementing the ICM Project in Da Nang, particularly on how to implement and complete the stages of the ICM cycle and address the challenges (Box 5).

With the knowledge and experiences gained from ICM implementation, the PMO staff became more confident in contributing to effective management of the seas and islands for Da Nang City. These also resulted in the establishment of the Agency of Sea and Islands of Da Nang City through Decision No. 3004/QD-UBND dated 19 April 2012 of the People's Committee. The new local agency, focusing on sea and island management, expanded rapidly to 14 staff. Furthermore, the Da Nang City's government issued Decision No. 3651/QD-UBND dated 5

Box 5. Sharing of lessons learned in ICM implementation in Da Nang.

Through the ICM Project, a good working environment has been created for the PMO staff to appreciate the learning-by-doing approach. It has opened up more opportunities for me to learn from and share my experiences with staff of other ICM sites within the East Asian region and in Viet Nam. This has significantly improved my skill in using various tools and methodologies for marine coastal and resource management.

Truong Cong Hai

PMO staff of the ICM Project
since 2004

June 2014 assigning the ICM PCC as the Steering Committee on Integrated and Unified Coastal and Marine Resources and Environment Management. This was an initial step in the institutionalization of the multidisciplinary coordinating mechanism in the process of mainstreaming ICM into its long-term coastal governance mechanism.

Lessons Learned

The involvement of the Da Nang leaders in the project from inception created a favorable environment for project implementation and was crucial for its success. With the establishment and operation of a multidisciplinary coordinating mechanism, the PCC contributed significantly in the modality of coordination and cooperation among and between sectors, organizations and districts in collectively solving issues confronting the coastal and marine areas of the city.

The mechanism strengthened the capacity of various stakeholders, including governments at the district and commune levels, and academic and social organizations, such as Da Nang University,

Farmers' Association, Women's Union and Youth's Union as well as all the coastal communities. The mechanism facilitated their involvement in consensus building and sustaining the support for coastal and marine resources management and environmental protection. At the beginning, stakeholder participation was passive. This situation gradually changed as the stakeholders were made to understand their role and contribution to sustainable coastal development.

Many sectors and agencies applied the ICM approach in their professional activities. For example, coastal use zoning was attentively considered and implemented by tourism, industrial, and agricultural sectors. Aquaculture activities were no longer practiced in Da Nang's coastal waters but instead along the estuarine area of Cu De River. Many social organizations implemented coastal resource and environmental protection campaigns in the city based on the experience of the ICM project.

Through collaboration and consultations on critical environmental issues, the sectors, agencies, and stakeholders continue to reduce duplication of efforts and increase their efficiency.

The ICM working modality, especially its coordinating mechanism, contributed to national efforts to establish a common coordinating model for Viet Nam. There were several different modes of operation and coordination of coastal management projects sponsored by other donor agencies, including the Viet Nam–Netherlands Integrated Coastal Zone Management Project,

implemented from 2000 to 2005. The achievements and lessons learned from operationalizing the coordinating mechanism were analyzed and showed the need for a common coordinating model. Thus, a common coordinating model for marine and coastal management at both national and local levels in Viet Nam was proposed as specified in different documents, such as:

- Decree No. 25/2009/ND-CP dated 6 May 2009 of the Vietnamese Government on integrated sea and islands resources management and environmental protection
- Circular No. 22/2012/TT-BTNMT dated 26 December 2012 of the Ministry of Natural Resources and Environment of Viet Nam, regulating the development and implementation of plan on integrated coastal resources management and environmental protection
- Viet Nam's National Integrated Coastal Management Strategy until 2020 and Vision to 2030, approved by the Prime Minister of Viet Nam through Decision No. 2295/QD-TTg dated 17 December 2014.

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Institutional Mechanisms for Integrating River Basin Management and Integrated Coastal Management: Xiamen/Jiulong River Experience

Belyn Rafael*

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Key Message

- An appropriate institutional arrangement is needed to integrate river basin and coastal management and to facilitate effective policy and interagency coordination across administrative borders. It can facilitate the resolution of use conflicts and address management challenges arising from upstream-downstream ecological, social, and economic interactions.
- Despite the importance of expanding integrated coastal management (ICM) coverage to include river basins, the process takes time due to challenges of transboundary implementation, and the different sectors and administrative units beyond the usual “ICM actors”. These sectors and units have various mandates and interests, which need to be identified, discussed and resolved in the governance and management development process.

Abstract

Integrating river basin concerns into ICM is a long and difficult but necessary process for effective protection of ecosystem integrity. Examples in the region are limited even in countries where ICM implementation has reached a level of maturity. In the case of Xiamen, PR China, the urgency of environmental concerns brought by pollution from upstream discharges drove efforts for collaboration between upstream and downstream municipalities. While the coastal and river basin management programs were being implemented separately, both included representation from the three local governments (i.e., Xiamen, Zhangzhou, and Longyan) facilitating discussions among decisionmakers across administrative boundaries. The Jiulong River Watershed – Xiamen Bay Ecosystem-based Management Strategic Action Plan identified concrete efforts at resolving transboundary

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environmental issues by improving capacity for management and coordination. Institutional arrangements evolved over time and their effectiveness was dependent on the political will and capacity to adapt and take advantage of emerging socioeconomic initiatives and political dynamics.

Background

The United Nations Development Programme (UNDP) defines institutional arrangements as the “policies, systems, and processes that organizations use to legislate, plan and manage their activities efficiently and to effectively coordinate with others in order to fulfill their mandate (UNDP, 2016).”

Institutional arrangements for ICM implementation are usually one of the first initiatives of an ICM program. In the course of implementation and with greater political acceptance, the institutional arrangement gains legal recognition or gradually becomes embedded in the operations of the local government. The arrangement is largely dependent on the political and legal conditions, the readiness of institutions to collaborate, available capacity resources, and the urgency of required actions.

Experiences in setting up an interagency, multisectoral mechanism in PEMSEA ICM sites indicate various challenges such as:

- legal processes that must be overcome and political buy-in to establish the mechanism;
- the overlapping, sometimes conflicting interests and mandates of government agencies and nongovernment groups and stakeholders who are supposed to represent the different sectors;
- absence of an urgent, unifying concern that must be addressed; and
- limited resources to maintain collaborative activities.

Setting up and strengthening an institutional arrangement becomes even more daunting when river basin concerns are brought into the discussion. River basins, watersheds, and coastal areas transcend administrative boundaries. The absence of a mandated “overseer” or a regional body that can coordinate ecosystem-based initiatives usually impedes the realization of an effective transboundary management program

In contrast to PEMSEA’s rich capability in ICM implementation (Chua, 2006), experience in the incorporating river basin concerns into ICM remains limited. This is due to the complexity of socioeconomic, ecological, political, and legal issues (Box 1). Only a few countries have made progress in linking the management of river basins and coastal areas through a formal institutional mechanism. Lessons can be learned from the ICM program in Xiamen, which evolved beyond focusing on coastal and marine management to include river basin issues. The Xiamen experience also shows that the process is complex but important for sustainable management of coastal areas.

Box 1. Integrating river basin concerns into ICM: socioeconomic and environmental considerations.

Integrating river basin concerns into ICM is especially crucial in Asia with the rapid urban expansion in coastal areas, resulting in increased competition for coastal space and resources. Asia is home to 60% of the world’s population but has only 37% of freshwater resources available. Urban population is expected to increase by 60% by 2025, putting more pressure to already dwindling water resources. Water management in coastal areas is important as 80% of the coastal pollution comes from land-based sources (Clausen, 2009).

Approach and Methodology

The demonstration period: Institutional set-up and management framework for ICM

Socioeconomic, political, and environmental forces shape institutional arrangements. The inclusion of river basin management in Xiamen's ICM program constituted the above factors together with regional economic cooperation and legal developments. Understanding how these factors influenced changes to the institutional mechanism can guide ICM implementation elsewhere to transform similar challenges into opportunities.

From 1994 to 1997, the Xiamen Municipal government implemented ICM to address resources use conflicts and environmental issues with support from the GEF/UNDP/IMO Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Seas (MPP-EAS). Several initiatives were implemented under the ICM program to improve legislation, enforcement, coordination, scientific support, and public participation. A major achievement was establishing an interagency Coordinating Committee that provided policy guidance and advice on implementation of ICM initiatives (PEMSEA, 2006). The committee was initially composed of 22 representatives from local government agencies, including planning, finance, marine affairs, land use, environment, fisheries, port operations, and tourism. The mechanism was supported by an interdisciplinary experts group that provided scientific and technical support for implementation (Figure 1) and the Marine Management Division (MMD), which functioned as the lead agency and ICM Project Management Office.

The first phase of ICM implementation focused mainly on addressing problems within the administrative boundaries of Xiamen. While it proved to be effective in solving pollution problems and multiple use conflicts within its boundaries, the marine environmental quality did not improve significantly due to pollution from the Jiulong River watershed.

In the second phase of ICM implementation (1999–2007), the mechanism was updated with a streamlined membership of 14 to promote efficiency (Figure 2). The coordinating office was lodged with the Oceans and Fishery Bureau (OFB). The committee eventually evolved as the Marine Management Steering Group (MMSG), a high-level interagency committee, headed by the Xiamen mayor as Chair and four vice mayors as deputy chairs (Chua, 2006, 2008; PEMSEA, 2006). An additional feature of the MMSG was the inclusion of the chief executives of the six districts in Xiamen to enhance coordination.

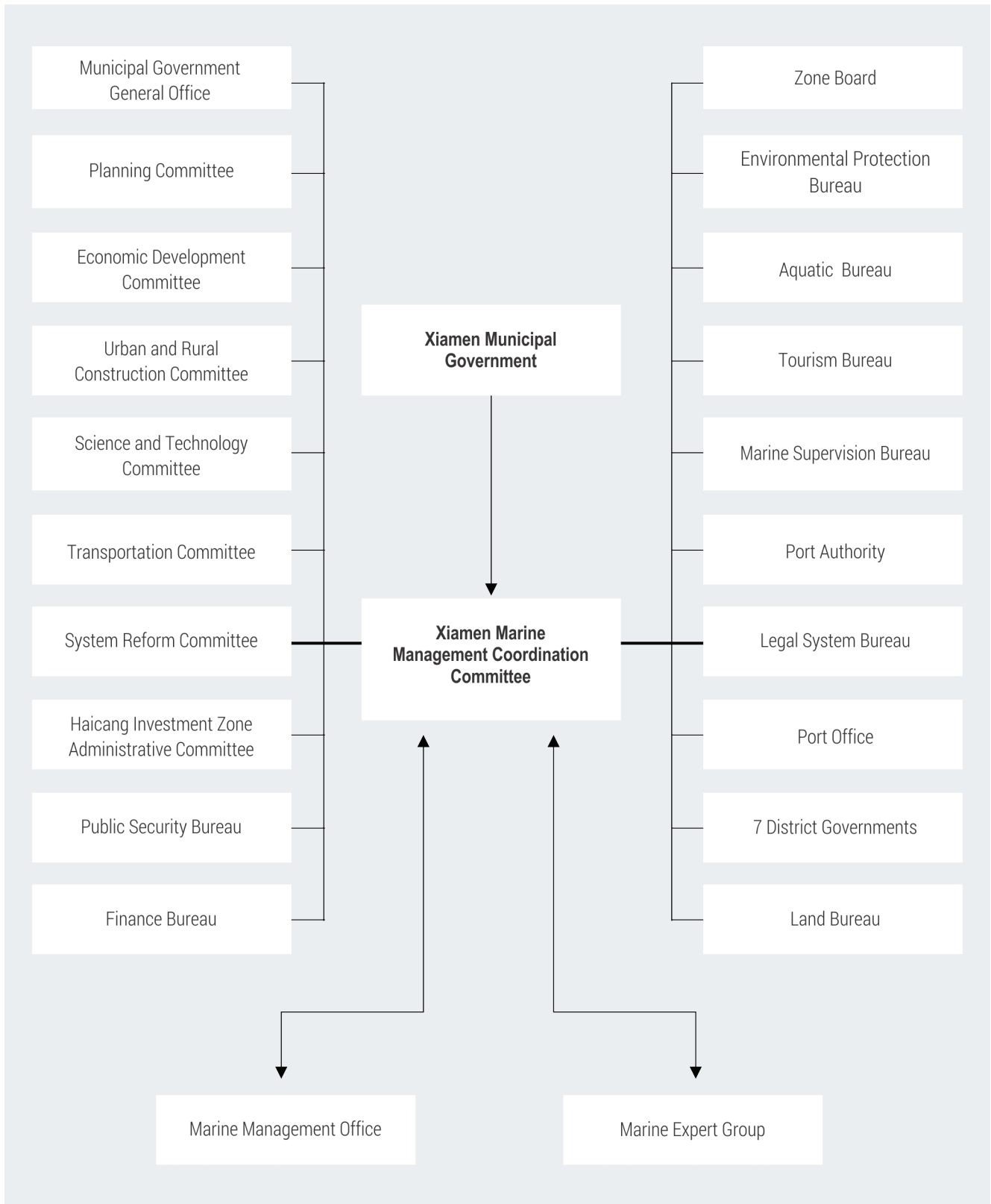
Parallel initiative: the Jiulong River Watershed Project (JRWP)

Parallel to the ICM implementation, the Fujian provincial government started the implementation of JRWP in 1999 to solve pollution issues in the watershed. The JRWP included all the administrative units along the Jiulong River watershed. At the start of implementation, the Leading Group for Integrated Management of JRWP was established and led by the deputy secretary general of the provincial government and the section chief of related provincial government agencies. The deputy mayors of Xiamen, Zhangzhou, and Longyan Municipalities served as members.

Scaling up period: Incorporating river basin initiatives under the ICM program

In its second cycle of implementation, the ICM Strategic Action Plan of 2005 incorporated specific actions to address pollution coming from Jiulongjiang (or Jiulong River). This cycle included the development of a management framework for the Jiulong River to address the transboundary issues of pollution together with the neighboring cities of Longyan and Zhangzhou (PEMSEA, 2007a; Zhou, et al., 2009).

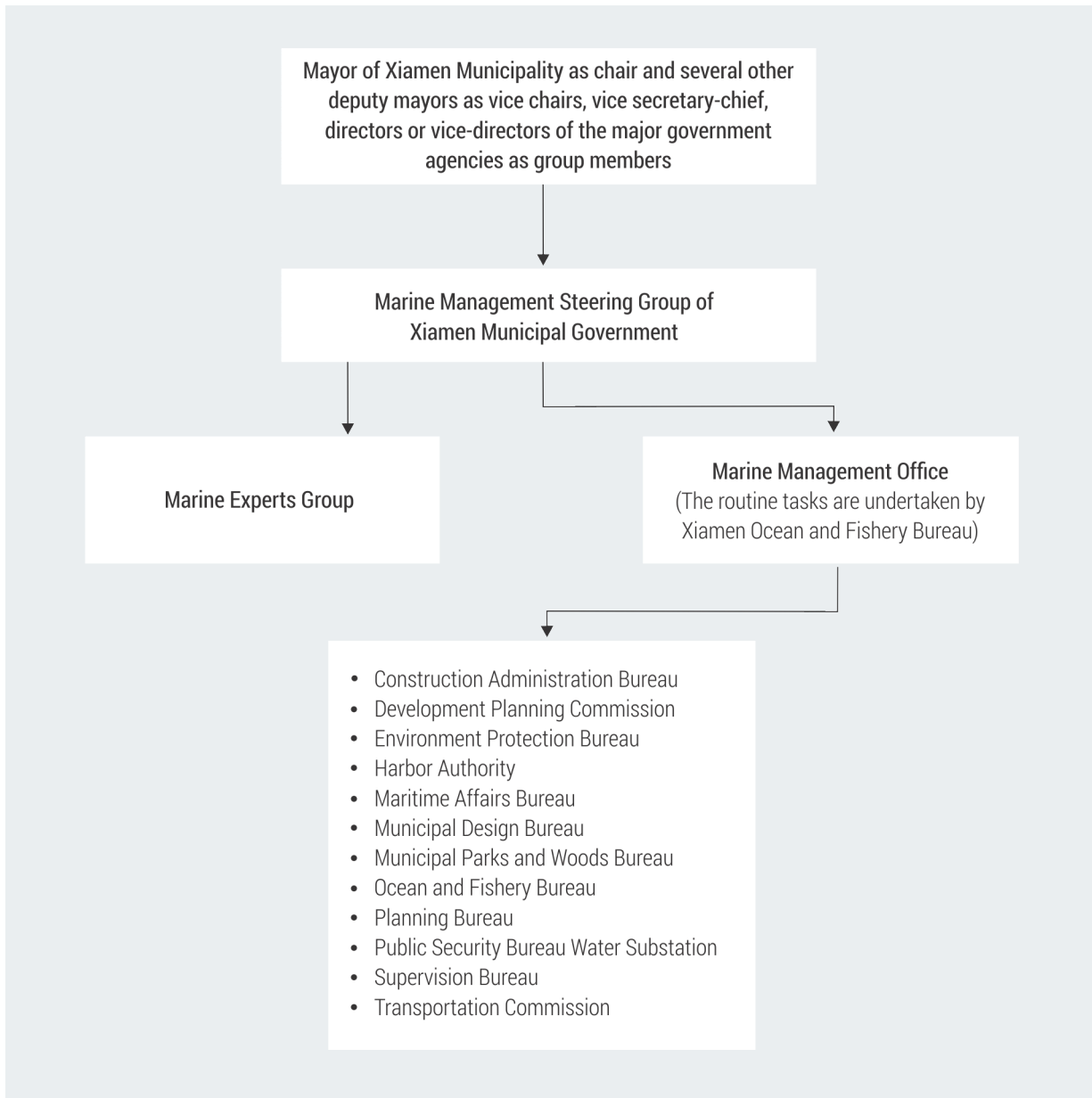
Figure 1. Xiamen Integrated Coordinating Board prior to 2002 (PEMSEA, 2006).



The Strategic Action Plan provided explicit targets on Jiulong River as indicated by its key strategies of:

- strengthening the ICM program and coordinating mechanism;
- establishing a regional coordinating mechanism and integrated land and coastal area management mechanism;
- creating an integrated Jiulong River management Coordinating Committee among Xiamen, Zhangzhou, and Longyan;
- establishing an integrated Jiulong River Management Action Plan; and
- setting up an integrated Jiulong River Management financial mechanism.

Figure 2. The streamlined coordinating mechanism for Xiamen ICM in 2002 (PEMSEA, 2006).



The JRWP Management and Joint Commission for River Basin

The five-year plan (2001-2005) for JRWP included a target on water quality for the West Xiamen Bay. By 2007, the leading group eventually evolved to be the JRWP Joint Commission on Integrated Management. The commission was chaired by the deputy governor, and members comprised deputy directors of provincial government agencies and deputy mayors of Xiamen, Zhangzhou, and Longyan (Figure 3). Each municipality subsequently established a leading group on watershed management chaired by the deputy mayor and supported by the Environmental Protection Bureau (Peng, et al., 2013).

Driving forces for integrating river basin management with ICM

Environmental impetus: Coastal and river basin interconnectivity. Xiamen implemented ICM since 1994 to address marine pollution and reduce use-conflicts in its coastal areas. Despite its achievements on ICM implementation, pollution and sedimentation from upstream sources transported by the Jiulong River were the two major environmental issues affecting Xiamen seas, which prompted a more conscious effort to incorporate river basin management into the ICM program (PEMSEA, 2006). Other impacts were:

- Agricultural nonpoint source pollution constituted 44% and 22% of total nitrogen and total phosphorus loading, respectively, to the Jiulong River. Livestock contributed 21% and 46%, respectively, of the total nitrogen and total phosphorus (XOFB, et al., 2012); and
- The Jiulong River discharged about 6.36 million tons of sediment annually and contributed to COD (53%), total nitrogen (70%), and total phosphorus (73%) loadings to Xiamen Bay (PEMSEA, 2006).

Despite the problems of pollution and sedimentation, Jiulong River was also very important to Xiamen by providing 80% of its freshwater supply. Incorporating

the Jiulong River basin into the Xiamen ICM was therefore a logical socioeconomic and environmental consideration.

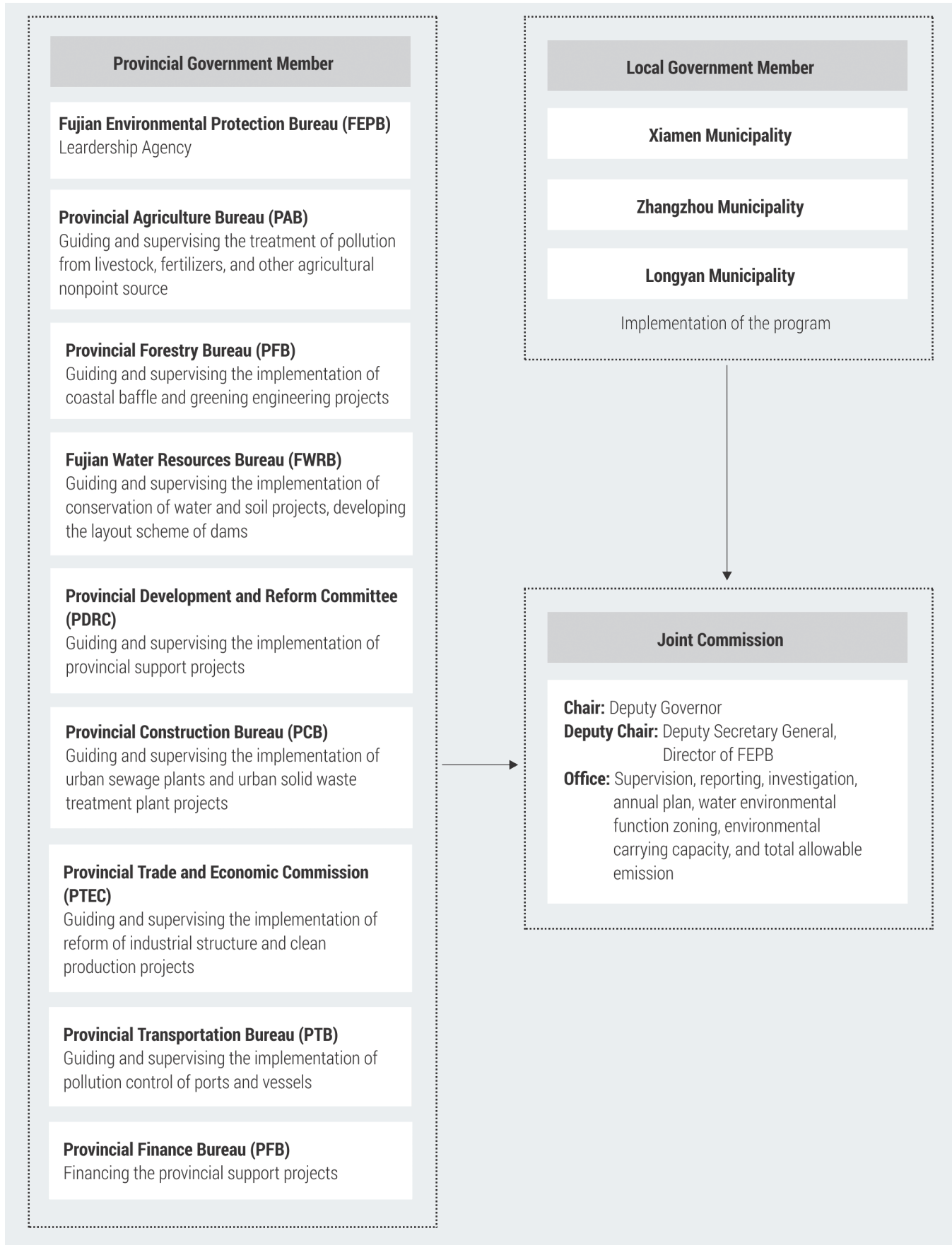
Economic cooperation can spill over to environmental protection. A City Alliance initiative established in 2004 by Xiamen, Quanzhou, and Zhangzhou was mainly focused on regional economic development (PEMSEA, 2007a, 2007b; Zhou, et al., 2009). It later expanded to cover environmental issues. The initiative focused on six key areas:

- city planning and construction;
- regional road system development;
- harbor development and distribution of coastline utilization;
- regional infrastructure construction;
- ecological conservation and environmental protection; and
- tourism development.

Longyan City, which is located upstream of Jiulong River, joined the alliance in 2006. Also, the approval of the West Taiwan Strait Economic Zone in 2009 provided strong support for the incorporation of the integrated Jiulong River and Xiamen Bay management plan into the state economic development strategy.

Policy and legal imperatives. An effective institutional mechanism is premised on and backed by policies and laws. The inclusion of river basin concerns with ICM is supported by decisions that strengthen the incorporation. In 2012, a Joint Decision on strengthening Jiulong River basin water environment protection was made by the Standing Committee of the People's Congress of Xiamen, Zhangzhou, and Longyan. Three municipalities formed a consensus to establish an intergovernmental coordination and management mechanism for mutual assistance, study, formulating responses on protection, and pursuing the common objectives of protecting the Jiulong River basin. A followup Zhangzhou Consensus was reached in 2014 to improve the joint cooperation mechanism and to strengthen the role of the three cities on water environment protection.

Figure 3. Joint Commission of Jiulongjiang River Watershed Integrated Management (Peng, et al., 2013).



Results

Improved awareness of ecosystem-based management at policy and decisionmaking level.

While the Xiamen ICM and JRWP were two separate initiatives, concrete efforts were undertaken and policies developed to integrate river basin management and ICM. The development of Jiulong River and Xiamen Bay Ecosystem-based Management Strategic Action Plan (JXSAP) aimed to promote an ecosystem-based management framework covering the three municipalities of Xiamen, Longyan, and Zhangzhou. The JXSAP identified environmental problems and strategies for dealing with the issues with the primary objective of enhancing the management and sustainable use of the Jiulong River and Xiamen Bay by improving the coordination between upstream and downstream cities (XOFB, et al., 2012).

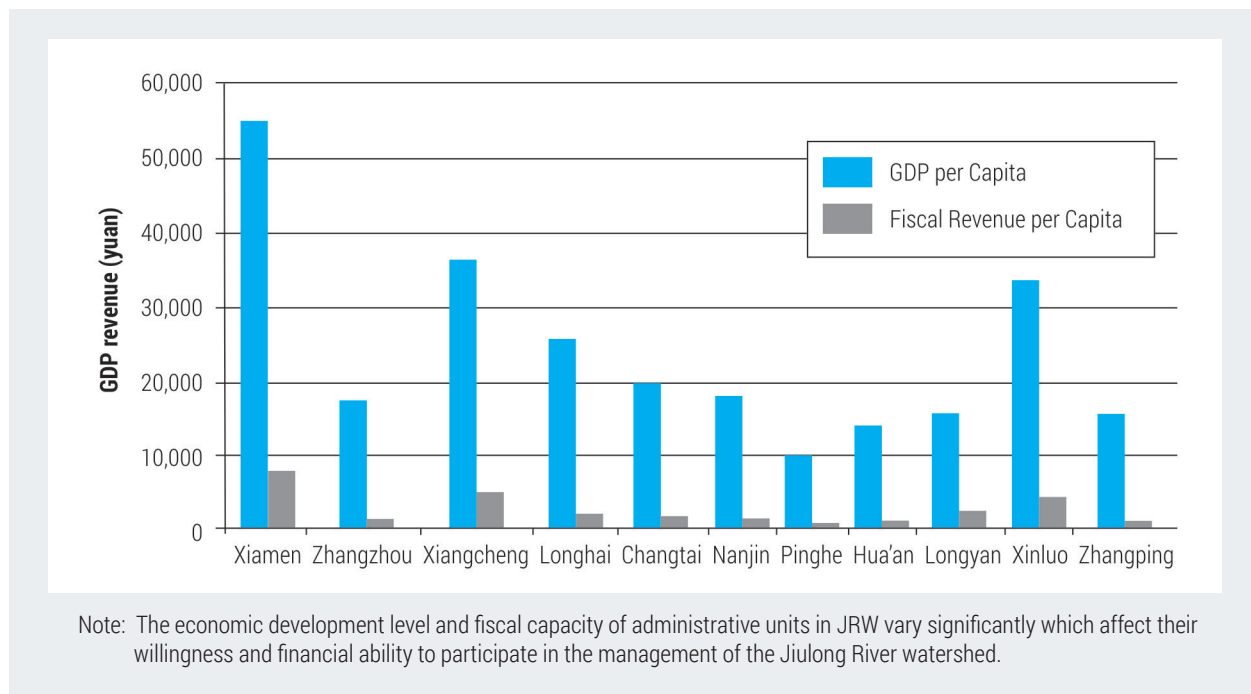
At the level of the Jiulong River Basin Management Program, the coordinating capacity of the Joint Commission for River Basin, which included Xiamen as a member and under the leadership of the Deputy Governor, provided a venue for

discussion, consultations, and coordination of policy, plans, and implementation programs among the three administrative units.

Cleaning upstream with downstream support: Ecological compensation mechanism.

Perhaps one of the biggest achievements on the upstream and downstream collaboration was the establishment of the ecological compensation scheme which provided a subsidy for upstream municipalities of Zhangzhou and Longyan to abate pollution. The municipalities were at different economic levels, with downstream Xiamen having the highest GDP (Figure 4) and benefiting considerably from improved water quality provided in the Jiulong River. An ecological compensation scheme was established in 2003. Under the scheme, Xiamen Municipality and the Fujian Provincial Environmental Protection Board (EPB) provided an annual subsidy of RMB 18M (US\$ 2.2M) (i.e., RMB 10M [US\$ 1.2M] from Xiamen and RMB 8M [US\$ 1M] from EPB) to address pollution concerns in the upstream municipalities.

Figure 4. GDP and fiscal revenue per capita of Jiulong River watershed (JRW) (2007) (Peng, et al., 2013).



Lessons Learned

Integrating ICM with river basin management allows wider application of ICM in promoting sustainable water resource use and management upstream. It is a gradual, difficult and long process but a necessary step to maintain ecological integrity. As ICM matures, its geographical coverage is often expanded to include upstream areas, including river basins and watersheds and the ecological, social, and economic interconnectivity of rivers and oceans.

In the case of Xiamen ICM and Jiulong River Watershed Project, complementary initiatives were started in the 1990s to address issues of upstream pollution by improving institutional mechanisms and the development of an integrated strategy. While significant progress was made to include river basin concerns, it was still far from being able to achieve an “embedded” river basin-coastal area institutional mechanism. This challenge arose from the complexity of ecological interaction but also from the complex political and institutional dynamics. Cooperation and collaboration were difficult given the different interests of the individual and institutions which were the primary actors. However, there were parallel economic and legal developments outside the usual efforts of both programs that contributed to the integration of ICM and river basin initiatives. Economic cooperation was the more binding and compelling reason that drove interest and support for environmental cooperation over time.

Institutional mechanisms evolve through time, adapting to the changing socio-political dynamics. Such dynamics occur over time for both the Xiamen ICM and Jiulong River Basin Watershed Management Programs. An effective evolved mechanism does not mean that there are no challenges in implementation. Financial constraints, unclear targets, and progress in achieving targets were concerns that needed discussion, consensus, and decisionmaking.

Ecosystem-based management of river basin and coasts can be achieved through a gradual, systematic, integrative, and coordinated approach applying the concepts and working methodologies of ICM and integrated river basin management. As demonstrated in the Xiamen-Jiulong examples, management of the entire ecosystem, from watershed to coast, took years of effort of provincial and municipal governments to address key challenges. The process involved continual review of the process made, and the experiences and lessons arising from local government initiatives.

Acknowledgment

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Strengthening Coastal Governance through the Application of Integrated Coastal Management-related Legislations

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Key Message

- Improving the effectiveness of coastal and ocean governance is a continuous process of protecting and maintaining the functions of coastal and ocean ecosystems to sustain the goods and services they provide to the communities, enterprises, and individuals.
- Integrated coastal management (ICM)-related legislations address different elements of governance, including interagency and multisectoral coordination, stakeholder participation, information management, financing, monitoring, and reporting. They likewise deal with the application of environmental management instruments, including marine protected areas (MPA), marine functional zoning, total pollution load control, valuation of ecosystem services, and disaster risk reduction and response.
- ICM-related legislations alone cannot possibly effect all the desired behavioral changes of resource users. A combination of social, economic, and regulatory instruments strengthens interagency cooperation, streamlines management actions, improves management effectiveness, builds awareness and ownership among the public and private sectors, and subsequently generates social, economic, and environmental benefits through continuous implementation of the ICM program.

Abstract

In 1981, Xiamen City became one of the five Special Economic Zones (SEZ) of the People's Republic of China, resulting in rapid urbanization and economic development. While huge economic gains contributed to an increase in GDP, unrestricted economic activities, coastal urbanization,

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and inadequate regulations on sea use caused massive marine pollution, coastal erosion, loss of coastal habitats and biodiversity, and multiple use conflicts among sectors. This case study reviews the structure of the ICM legal framework of Xiamen and specific provisions that regulated economic activities from the late 1990s to 2010. These ICM-related legislations cover different elements of governance, including interagency and multisector coordination, information management, stakeholder awareness and participation, financing, monitoring and reporting. Some management measures were also made statutory, such as the total pollution load system, marine functional zoning and licensing, marine ecosystem damage compensation, establishment of MPA, and emergency responses for disasters and marine pollution. The effective engagement of stakeholders in compliance, monitoring, and enforcement was critical to the successful implementation of ICM-related legislations.

Background

Xiamen City became an SEZ in 1981. The subsequent economic upswing, coupled with rapid population growth and coastal urbanization, created a demand for more employment, food, energy, and living space, among others. Coastal reclamation, aquaculture, ports and shipping not only brought huge environmental pressure, but also severe conflicts in the use of the sea space between fisheries, shipping, coastal engineering, waste disposal, and tourism sectors (PEMSEA, 2009; Zhang and Xue, 2013).

The operation of 15 different ocean-related sectors managed by various line agencies in Xiamen often caused conflicts in terms of policy and management measures because there was a lack of cooperation and coordination among these sectors (Fang and Ma, *this volume*). Massive marine pollution, overfishing, and extensive reclamation projects caused significant environmental damage, loss of coastal habitats, and decline in biodiversity. These affected the functional

integrity of the mangrove forests, caused decline of certain fish stocks, and threatened extinction of the Chinese white dolphin, egret, and lancelet in the coastal areas around Xiamen (Zhang and Xue, 2013). At that time, laws were sector-based, leading to fragmentation in coastal governance. Law enforcement was likewise ineffective due to lack of resources and cooperation among the different agencies (PEMSEA, 2009).

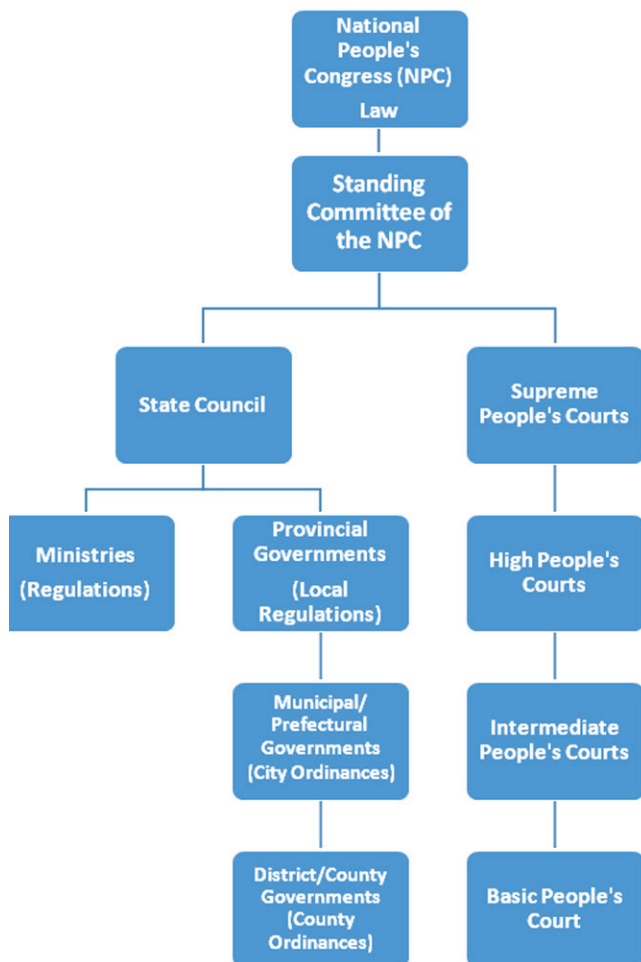
ICM is widely accepted as an appropriate coastal management approach in dealing with coastal issues (Cullinan, 2006), and is now widely applied in the East Asian Seas (EAS) region. Xiamen was one of the first cities in the region to demonstrate ICM effectiveness through development and implementation of a Strategic Environmental Management Plan (SEMP) and enactment of local legislation in support of ICM implementation.

The PR China implements a unified legislative system across all levels of government (Figure 1). In the case of coastal area management, numerous specific sector or marine-related national laws constitute the key elements of a broad-based ICM-related legislative framework covering different aspects of sustainable development, such as water resource management, fisheries management, pollution management, and conservation. Some of these national laws, such as the Environmental Impact Assessment (EIA) Law, are implemented ubiquitously across PR China, making the enactment of local legislation unnecessary. For other national laws (such as the Marine Environmental Protection Law), local governments need to enact supportive regulations to enable its full implementation.

Approach and Methodology

This case study reviews coastal governance and management legislations of Xiamen Municipality after it attained the SEZ status. The analysis includes local legislations/regulations in support of sector-

Figure 1. The legislative structure of China.



based, national environment policies/legislation. In particular, the analysis attempts to synthesize the integration of sector policy and legislations in strengthening the effectiveness of ICM program implementation towards achieving set sustainable development objectives

Legislative reforms and ICM program

Before 2000, ICM-related legislation in Xiamen primarily focused on establishment of lancelet and egret protected areas, protection of the Chinese white dolphin, navigational safety, and sea use regulation. From 2000 to 2015, several new regulations were developed and adopted (Figure 2), which constituted a legal framework in support of ICM program implementation, covering different

aspects of sustainable development of coastal areas including habitat and species, fishery and aquaculture, pollution and waste management, water resources and use, and navigation and ports (PEMSEA, 2007; Bonga and Chua, this volume). In addition, the Regulations on Protection of Marine Environment contained specific provisions relevant to climate change adaptation, disaster management, and fishery management which addresses the key management concerns of ICM. ICM-related legislations in Xiamen were further developed and implemented especially pertaining to the following:

Strengthening coastal governance

Legislation can strengthen coastal governance by creating specific statutes that detail governance mechanisms. The following examples from Xiamen highlight such provisions, as illustrated under different aspects of governance under the ICM framework (Figure 3):

1. Coordinating mechanisms for protection of marine environment and coastal ecosystems.

The Regulations on the Protection of the Marine Environment in Xiamen (2010), required the establishment of an integrated ocean and coastal management coordinating mechanism, in accordance with the principles of land and sea integration, centralized coordination, and scientific decisionmaking (Article 2). The regulations also required the city government to establish an intercity coordination mechanism for the protection of the marine environment and restoration of coastal ecosystems in Xiamen Bay and Jiulong River watershed area (Article 3). The provision also required the Xiamen City government to establish two coordinating mechanisms for Zhangzhou and Longyan, which are the two upstream cities of Jiulong River Basin.

2. Integrated information management system.

The Regulations on the Protection of the Marine Environment (2010) stipulated that the

Figure 2. ICM legal framework in Xiamen.

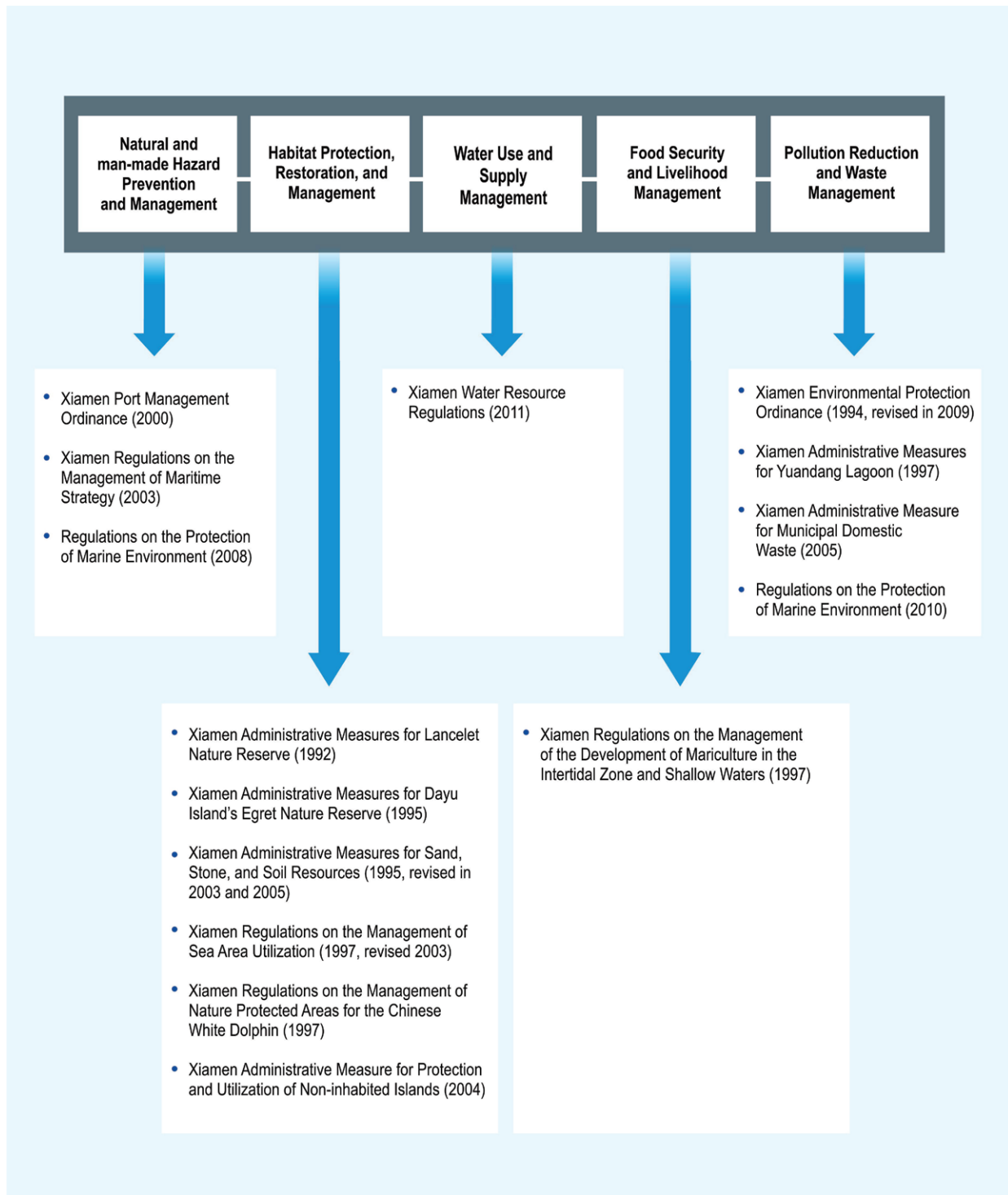
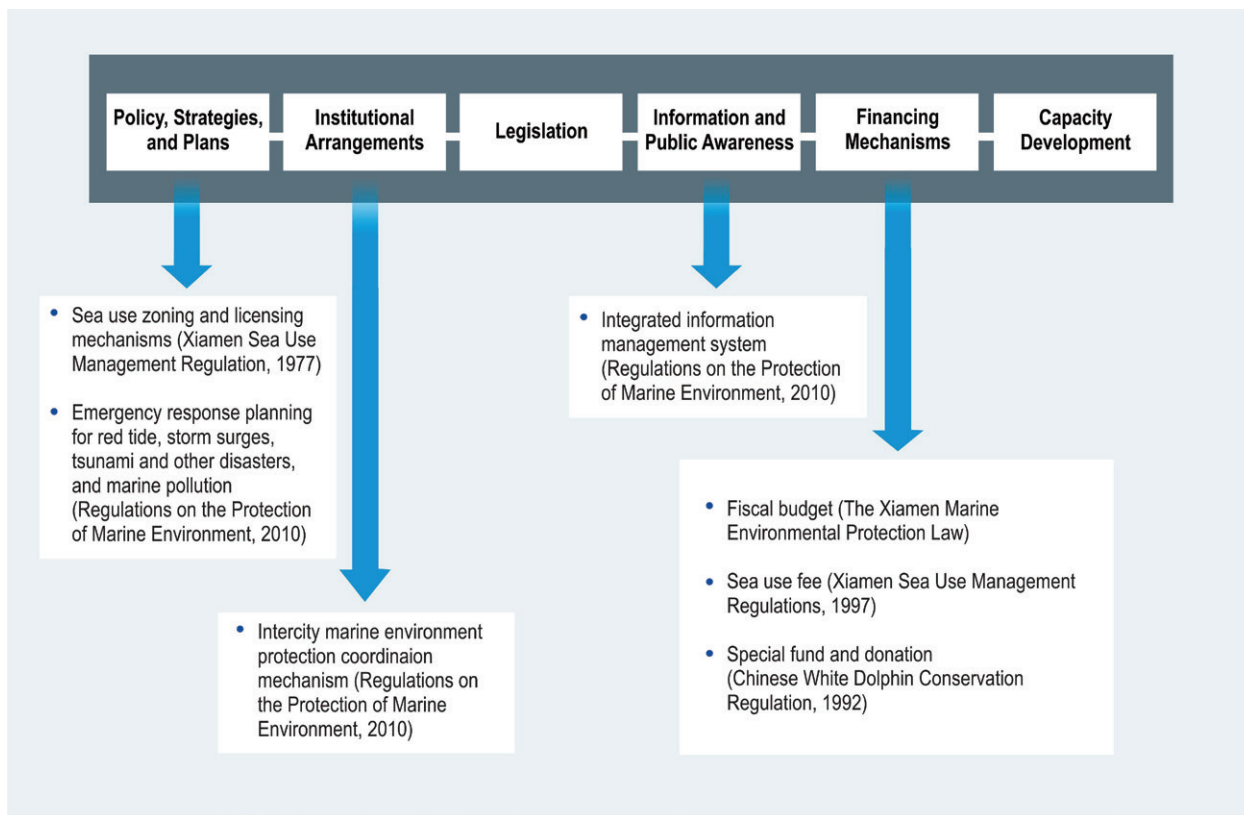


Figure 3. Statutes that strengthen different aspects of coastal governance in Xiamen ICM legal framework¹.



Xiamen Ocean and Fisheries Bureau (XOFB) would be in charge of survey, monitoring, surveillance, networking, and development and maintenance of an integrated marine information system (IMFS) (Article 10). Relevant bureaus with mandates on ocean management and monitoring were required to integrate their monitoring and observation data into the IMFS.

3. Financing for coastal and marine environment and disaster reduction. Financing for marine environment protection, ecosystem restoration, disaster risk reduction, and endangered species

protection was clearly provided in several legislations with the following designated four sources of financing:

- a. **Fiscal budget.** The Xiamen Marine Environment Protection Law required city and district governments to gradually increase investments in marine ecosystem restoration, marine disaster preparedness and risk reduction, and marine environment pollution treatment. Funding would be included in the fiscal budget within the different levels of governments (Article 7);

¹ For more discussion about the governance elements within the ICM framework, see *Bermas and Chua (this volume)*.

- b. **Sea use fee.** The Xiamen Sea Use Management Regulations mandated the levy of sea use fee for six types of activities (i.e., engineering, industry, tourism, fishery, dumping, and other activities) (Article 4). The same regulation allowed the sea use fees to be used for sea area development and construction, conservation, and management (Article 19);
 - c. **Special fund.** The Xiamen Chinese White Dolphin Conservation Regulation (1997) stated that the city government would establish the Chinese White Dolphin Conservation and Development Special Fund to support species conservation, MPA management, scientific research, education, and awareness-raising activities (Article 4); and
 - d. **Donation.** The same regulation on Chinese white dolphin conservation encouraged organizations and individuals to donate for conservation of the species and its habitat (Article 4).
- 4. Mandatory application of ICM tools.** ICM tools applicable in the ICM cycle were also made mandatory by legislation in Xiamen. These included MPA, marine functional zoning, total pollution load control, valuation of ecosystem, and emergency response to disasters. Statutes of such legislation are specified below:
- a. **Total pollution load control system.** The Regulations on the Protection of the Marine Environment (2010) required XOFB to prepare a total allowable pollution load implementation plan in the municipal coastal waters in collaboration with environment, fishery, and maritime bureaus (Article 5).
 - b. **Sea use zoning and licensing.** The Xiamen Sea Use Management Regulation (1997) provided the application of a sea use zoning system to strengthen sea use management and protect marine ecosystems (Article 1). Article 8 ensured that sea use rights were licensed through application and transfer. Article 5 mandated city administrative departments that were in charge of the city's coastal waters to utilize integrated and unified management and coordination in the implementation of the provisions of this regulation as well as the implementation of the marine functional zoning (MFZ) scheme. Article 6 stated the prohibitions on the use of waters, while Article 7 presented the fixed-exclusive utilization of waters and the application of the use permit system and system of paid use. Finally, Article 20 enjoined the users of the sea to assume an obligation to protect marine resources and ecological environment, under the supervision and inspection of the relevant marine administrative departments. Failure to do so would be grounds for investigation and penalties to subject sea users. Article 20 further specified bidding, auction, and concession as the three ways to dispose of or transfer the sea use rights.
 - c. **Marine ecosystem damage compensation.** The Regulations on the Protection of Marine Environment required relevant government agencies and their designated public service entities to litigate enterprises for compensation, for costs to treat pollution made by the damaging party, or to restore the integrity of marine ecosystems, marine species population, or MPA caused by the damaging party.

- d. **MPA.** Through the Xiamen Administrative Measures for Lancelet Nature Reserve (1992), the Xiamen Administrative Measures for Dayu Island's Egret Nature Reserve (1995), and the Xiamen Regulations on the Management of Nature Protected Areas for the Chinese White Dolphin (1997), the city established three national marine nature reserves for protection of the lancelet, egret, and Chinese white dolphin, respectively, which also covered their habitats and the regulation of activities within that will have potential impact on the survival of the concerned species. For example, the Xiamen Chinese White Dolphin Protection Regulation (Article 14) required that the speed of ships in the port area within the Chinese White Dolphin Nature Reserve be limited to less than 8 knots per hour. Additionally, the regulation mandated all administrative departments in Xiamen City to contribute and closely cooperate to improve the protection of dolphins. The establishment of an information system was also ordered, as well as the popularization of scientific knowledge on the species for public awareness.
- e. **Emergency response planning.** The Regulations on the Protection of Marine Environment (Article 11) required the city government to develop emergency response plans for red tide, storm surges, tsunamis, and other marine disasters, as well as for significant marine pollution accidents.
5. **Law enforcement through joint monitoring.** A multiagency law enforcement mechanism was set in place in Xiamen. The Xiamen Ocean Management Office (XOFB) was the lead agency in coordinating the joint law enforcement activities under a model of “joint enforcement and separate prosecution.” The Marine Supervision Brigade, a force consisting of harbor, fishery, water policy, and environmental supervisors, was formed within the XOFB and organized into an integrated law enforcement group (McCleave, et al., 2003). The formation of this enforcement group improved frontline law enforcement and supervision of marine management, such as the provisions laid down in the implementing guidelines for the marine functional zoning.
- The brigade was mandated for the surveillance and prosecution of violations of sea area use plans, such as installing of fishing nets, illegal operations, and installation of aquaculture facilities that impact the proper function of the navigation routes, destructive fishing methods, dumping outside designated zones, underwater explosion activities without prior approval, and coastal reclamation activities.
6. **Development of incentive and disincentive measures for compliance with ICM-related legislations.** Incentives were widely used and legalized in Xiamen to promote compliance. The Xiamen Chinese White Dolphin Protection Regulation required the Xiamen City government or the XOFB to award individuals and organizations for exceptional performance in management, research, awareness raising, education, and compliance, as well as reporting of activities to competent authorities that harm the species. Similarly, Article 6 of the Xiamen Marine Environmental Protection Law also required the city government and other relevant bureaus to award individuals and entities with exceptional performance in the conservation and protection of the marine environment.
- The Regulations on the Protection of the Marine Environment (Article 12) established a credit mechanism whereby marine

environment protection practices of enterprises with sea-based operations would be assessed by XOFB. A good credit list and a black list would be made available to the public each year based on assessment results. Article 13 further stipulated that enterprises with good credit would be awarded by the government, while enterprises on the black list would be deprived of rights to bid on projects that were tendered by the city government. In addition, proof of compliance with environmental protection regulations would not be issued by authorities to enterprises on the black list in securities listing application.

Results

Effective coordinating mechanisms

The intercity coordination mechanism established as early as 2004 under the City Alliance among Zhangzhou, Quanzhou, and Longyan was strengthened with the adoption of the aforementioned legislation. The mechanism is currently responsible for reviewing regional economic and environmental plans among the top city leaders. The effectiveness of the coordination mechanism was evident with the full participation of the ocean, environment, agriculture, and forestry sectors of Longyan and Zhangzhou during the preparation and development of the Jiulong River and Xiamen Bay Ecosystem-based Management Strategic Action Plan (SOA, et al., 2012).

Improved sea use efficiency

As a result of the Regulations for the Management of Sea Area Use, the sea areas in Xiamen were divided into four major areas with nine zones: shipping/port, tourism, fisheries, coastal industry,

ocean engineering, mining, nature reserve, special functions (such as for research, outfall discharge, and military), and rehabilitation. The marine environmental problems and the conflicts in the use of the sea were reduced and the condition of the environment was slowly restored with a much stronger enforcement of MPA. The sea use fees collected, as stipulated in the local law, were allocated for the protection of the marine resources and the environment, 30% of which was turned over to the national treasury (Zhang and Xue, 2013).

Reduced violations of ICM-related legislations through joint law enforcement

Three brigades were subordinated to the Xiamen Integrated Marine Administrative Regulation Enforcement Brigade and conducted joint daily surveillance of the 3.9 million km² of sea areas under Xiamen's jurisdiction with other agencies. The high number of violations intercepted by the joint enforcement team and the strict application of penalties to a large extent deterred the occurrence of violations. For example, in 2008, of the 6,002 inspections carried out, 557 violations were recorded and 416 administrative penalties were imposed (PEMSEA, 2015).

Contributing to a national law on administration of the seas

The experience of Xiamen city was recognized at the national level. The enactment of a national legislation, the Law of the People's Republic of China on the Administration of the Seas, was approved by the People's Congress in 2001. Its general purpose as stated in the law was to strengthen administration of the use of sea areas; safeguard State ownership of the sea areas and the legitimate rights and interests of the sea area users; and promote rational development and sustainable utilization of the seas.

Lessons Learned

Comprehensive legislation and coordinated multi-agency enforcement.

Shifting from the sector-based legislation to integrated management of coasts involving different stakeholders was a time-consuming process and caused many failures in legislative reforms. The adoption of the sea use management regulation in 1997 by Xiamen was largely facilitated by ICM demonstration of coastal use planning. The success in resolving conflicts in the sea use planning process was ascribed to the engagement of the scientific community, stakeholder participation, and coordination by the Xiamen City government.

For ICM-related legislations to be effective, every detail of the legal process needs to be covered.

The legislation was not only about lawmaking. It was a process that entailed implementation, compliance, monitoring, and enforcement. In the case of Xiamen, compliance was greatly enhanced by instituting incentive measures for individuals, organizations, and enterprises with outstanding performance in compliance, and disincentive measures for enterprises that failed to comply with the law. Awareness-raising was equally important to enhance compliance. Similarly, joint enforcement was ensured by agencies with mandates in ocean management, thus leaving violators little chance of bypassing legal obligations without being prosecuted and penalized.

ICM-related legislations in Xiamen were able to address different aspects of governance and ICM tools. The Regulations on the Protection of the Marine Environment made integration of land and sea, central coordination, and scientific support as the overarching principles. All these statutes contributed to the application and sustainability of the ICM program in Xiamen.

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Systematic Process of Data and Information Gathering and Sharing

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Key Message

- Effective use of information is a valuable good practice in strengthening policy and decisionmaking especially for ICM program development and implementation.
- The stage-wise ICM process facilitates a goal-oriented and systematic data and information gathering. This process allows the development of specific outputs to support sound planning and informed decisionmaking.

Abstract

Integrated coastal management (ICM) covers a broad scope of disciplines and requires access to a wide array of information from different sectors and stakeholders. Accurate information is critical in sound planning and identifying better interventions in the management of the environment. Most of the time, however, even when these data/information are available, they are either inaccessible or in formats that cannot be utilized to support planning and decisionmaking.

Data gathering, processing, and analysis are tedious and time consuming activities that require significant amount of human and financial resources. This case study details how the stage-wise ICM cycle facilitates a goal-oriented and systematic data gathering process.

The study also discusses the importance of establishing a computerized database such as PEMSEA's integrated information management system (IIMS) to facilitate data storage, access, and packaging to support planning and decisionmaking in ocean and coastal management. The case of Manila Bay illustrates (i) how the data from the different sectors and stakeholders, including outputs from the implementation of the Manila Bay Coastal Strategy and Operational Plan were compiled into the Manila Bay IIMS; and (ii) how the data gathered can be converted into formats, such as the Manila Bay Environmental Atlas and the State of the Coasts reports, that supports planning and decisionmaking.

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Background

Integrated coastal management (ICM) covers a broad scope of disciplines thus requiring access to a wide array of data and information. Understanding the socioeconomic, cultural and natural values, demography, and ecological conditions, including threats and management issues, is key to developing a strategic program for coastal and marine and river basin management.

Access to these data and information, however, is oftentimes confronted with difficulties. Among the common issues are: inadequate technical and financial resources to gather and analyze data; inadequate access and policies or mechanisms that facilitate sharing of data and information among data providers and users; the large diversity and coverage of data when dealing with coastal and marine areas; lack of a standardized system for data gathering, collation, and recording; and deficiencies in quality control, data reliability, and accuracy.

In many cases, data are collected, stored, analyzed, and used separately by different government agencies and sectors to meet their individual needs and mandates. As a result, information is not fully utilized to provide a comprehensive picture of the ecological and socioeconomic conditions of the area. In addition, because of the lack of coordinated information gathering and utilization approach, there is often duplication of effort and inefficient use of available resources.

Embarking on extensive data collection is time consuming and requires a significant amount of human and financial resources. As such, strategies for addressing the perceived challenges of data access mentioned above should be considered before planning on data gathering activity.

Engaging the different government agencies and sectors must be facilitated in order to promote

integrated data/information gathering and avoid duplication of effort and inefficient use of resources. The diverse data required at different stages of the ICM program can be addressed by knowing what to collect, when to collect, and how these data fit into the final analyses for management actions.

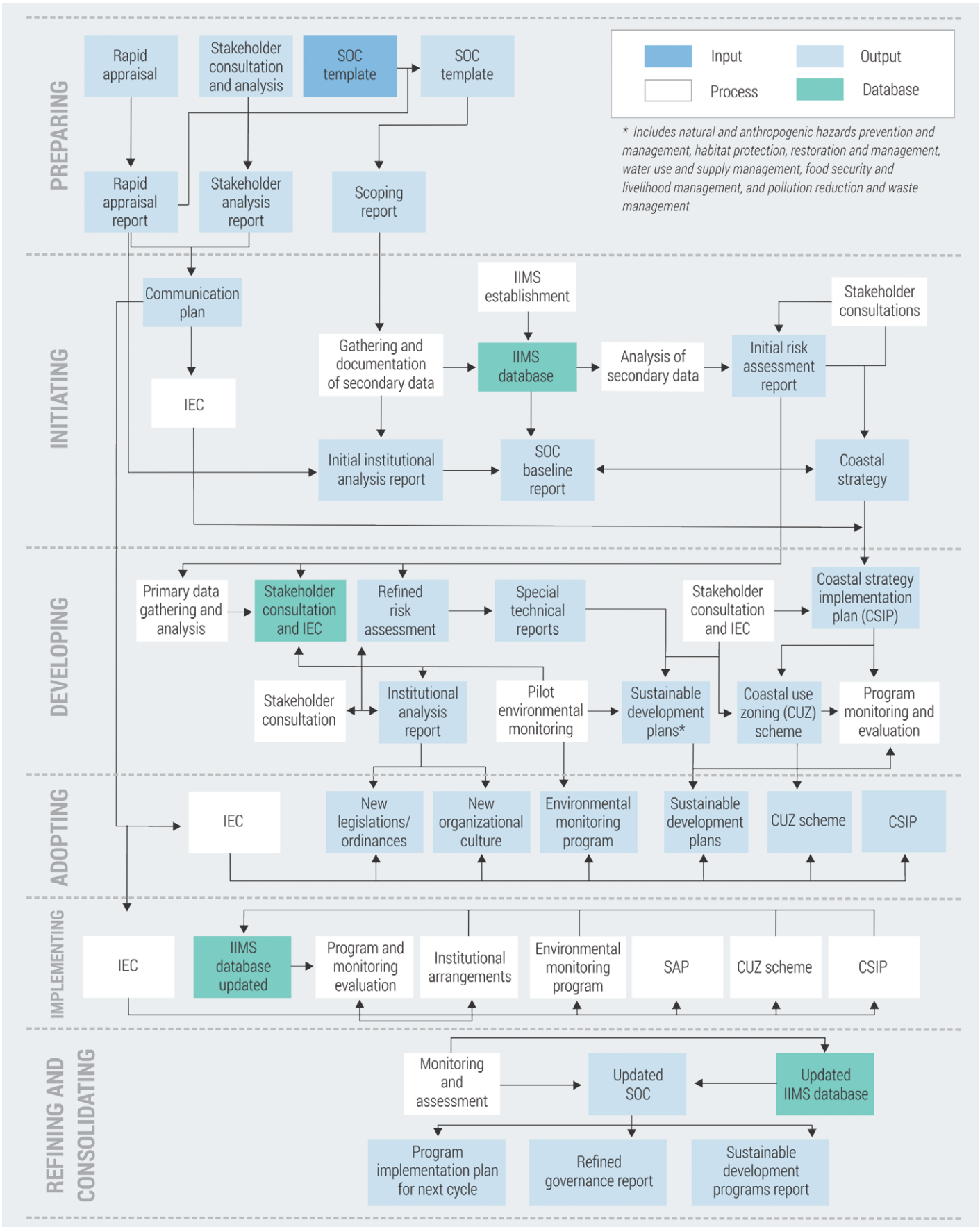
Approach and Methodology

Data gathering process and the ICM cycle

In ICM, various outputs requiring specific data/information are needed in the different stages of program development and implementation. Availability of the needed data/information facilitates the completion of the required output(s) in each stage. At the same time, in the preparation and implementation of specific activities at each stage of the ICM cycle, generated data and information feed into an information management or a monitoring, evaluation, and reporting system of the local government.

Data gathering and analysis is a continuous process in the ICM cycle. Data/information gathered in each stage are analyzed and processed for the completion of required outputs. The output from previous stages is an important input to the succeeding stages of the ICM cycle. The stage-wise data gathering process and analyses linked to the ICM cycle provide a systematic approach in determining the data to be collected and analyzed so that planning, management, and decisionmaking in ICM are supported. Such a process allows efficient and cost-effective data gathering. [Figure 1](#) shows the data gathering process and the analyses to be undertaken in each stage of ICM implementation.

Figure 1. Information gathering, analysis, and applications in coastal management.



Note: see Appendix for the acronyms

The figure identifies the tools and methodologies employed, including important outputs generated from the data/information gathered at each stage of the ICM cycle (PEMSEA, 2008).

For example, in the *Preparing stage*, rapid appraisal, an easy to apply method and meant to generate output in limited time, is conducted to gather demographic, socioeconomic, biophysical, institutional, political, and governance data/information. The information gathered provides initial baseline conditions of the area. It is also in the preparing stage that the stakeholder analysis report, which identifies the key stakeholders, including their interests and potential impacts in the program, is prepared.

The rapid appraisal and stakeholder analysis reports are important inputs to the required outputs in the second or *Initiating stage* of the ICM cycle. In particular, these outputs are important in analyzing and formulating strategic environmental plans and the basis for developing the Coastal Strategy, communication plan, and initial institutional analysis report. Secondary data/information are also gathered at this stage to develop the State of the Coasts (SOC) baseline and initial risk assessment (IRA) reports. The SOC and IRA identify the priority areas and issues that need to be addressed in the ICM program. With the data/information gathered, it is also fitting to establish an IIMS where the data can be stored and updated as additional data become available in the succeeding ICM stages.

Based on the results and priorities identified in the SOC baseline and IRA, the Coastal Strategy Implementation Plan (CSIP) and Strategic Action Plans (SAP) are developed in the *Developing stage*

of ICM implementation. Gaps identified in the IRA are addressed through primary data gathering and the refined risk assessment report is prepared. It is also in this stage where the pilot environmental program is initiated and coastal use zoning (CUZ) scheme and special technical reports are prepared. Data gathered in this stage are again fed into the IIMS database.

In the *Adopting stage*, the proposed institutional arrangements, specific plans and programs (e.g., CSIP, environmental monitoring program, SAP, CUZ scheme), and new legislations or ordinances supporting ICM are adopted. It is important that required information that will clarify or support the adoption process is available.

Following the adoption of the different programs and plans is the *Implementing stage*. Most crucial in the ICM stages, this is where intervention is done on the biophysical, social, and economic aspects based on the identified activities in the CSIP and SAP. Results of implementation are encoded into the IIMS to facilitate monitoring and evaluation of the ICM program.

In the *Refining and consolidating stage*, results of the implementing stage are fed into the monitoring and assessment of the current ICM cycle. It is also in this stage where the SOC updating is warranted. The needed refinement and improvement of the ICM program are also employed in this stage. The ICM cycle then continues.

The section on [Appendix](#) further outlines the required outputs, including the types of data needed and the process of data gathering and/or development of the output in each stage of the ICM cycle.

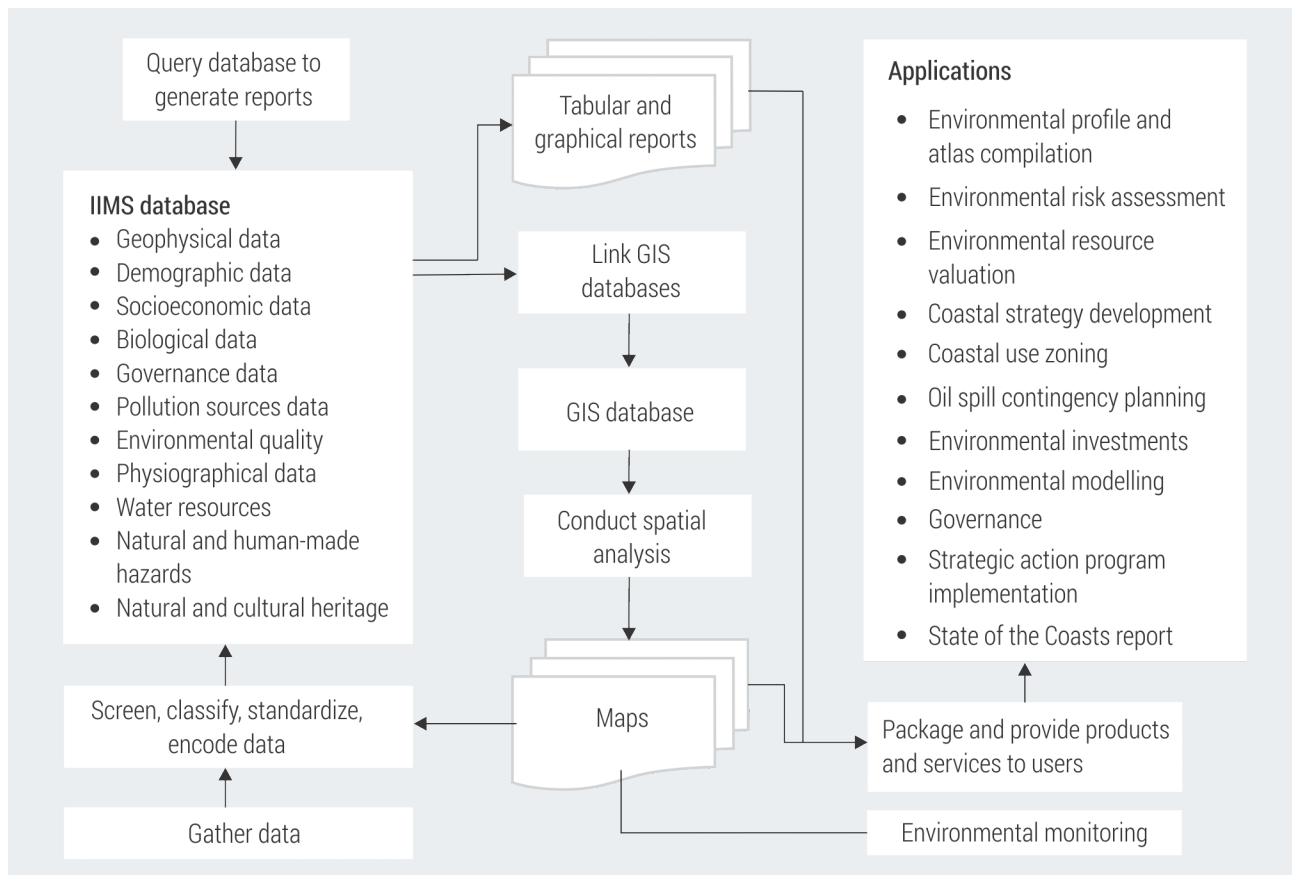
Facilitating use of information for better management

The goal for data gathering does not end in acquiring the needed data/information, but most importantly, how these data/information can be utilized for an informed management decision, and disseminated for use of other stakeholders. In many cases, even when data are available, these are not transformed into a format that can be used to facilitate and support planning and decisionmaking.

With the diverse data/information collected at various stages of ICM, it is fitting to store them in a proper database management system that can be updated and retrieved when necessary. Manual retrieval will entail time and effort. A computerized database is important to store, retrieve, and manage large and diverse types of data on a continuous basis. At the same time, the data gathered need to be transformed and packaged into useful information that is needed by the users, including planners and decisionmakers.

PEMSEA developed the integrated information management system (IIMS) to facilitate integrated data/information gathering, access, and use in ICM programs. The IIMS captures 12 categories of data relevant to marine and coastal areas and river basins. It is a comprehensive relational environmental database that captures data needed for environmental management, planning, and decisionmaking. It standardizes data formats collected from different sites thus facilitating cross-comparison and analysis of data among sites, data providers, and users. The query system of the IIMS is designed to support the retrieval of information in a format required by environmental planners, managers, decisionmakers and policymakers, and other stakeholders (Figure 2). As discussed in the previous section, IIMS is established in the initiating stage of ICM implementation and updated continuously throughout the stages and next cycles of ICM.

Figure 2. Data categories in IIMS and their applications supporting planning and decisionmaking for integrated coastal and river basin management.



Results

The case of Manila Bay, Philippines

Manila Bay Area Environmental Atlas

In Manila Bay, the Manila Bay Information Network (MBIN) was established and used IIMS as a database platform. The MBIN consisted of the Regional Offices of the Department of Environment and Natural Resources (DENR) in the Manila Bay Area (Regions 3, 4A, and NCR), relevant national government agencies, local government units, and academic institutions. The MBIN members worked together to update data for the Manila Bay area, particularly data from ongoing environmental monitoring programs. One important spinoff from the MBIN was the establishment and operation of the Integrated Environmental Monitoring Network for Manila Bay. In Manila Bay, a number of government agencies were undertaking regular monitoring activities, covering the habitats, biophysical, and ecological conditions of the bay. However, the monitoring programs were, in some cases, duplicative, while other areas/concerns in the bay were not being monitored adequately. Recognizing these gaps, the agencies agreed to adopt a cross-sectoral, integrated monitoring program and to utilize IIMS as a common and shared database. This approach promoted closer coordination and cooperation, cost sharing, and data and information sharing among the stakeholders. The result, therefore, has been a more complete and comprehensive picture of the physical and ecological conditions of the bay.

An innovative product of this integrated data gathering, analysis, and packaging among different sectors and stakeholders in the bay was the *Manila Bay Environmental Atlas (PEMSEA and MBEMP-MBIN, 2007)*. The information contained in the atlas were compiled from the different agencies with mandates and responsibilities in the Manila Bay area and from the different outputs generated during ICM program implementation in the bay, including environmental risk assessment, integrated

environmental monitoring and implementation of the Manila Bay Coastal Strategy and the Operational Plan for the Manila Bay Coastal Strategy.

The available data were analyzed and transformed into visually relevant formats and utilized in the production of the atlas. It provides statistical and spatial data to stakeholders in the form of composite maps, graphs, and tables that describe the physical, biological, and socioeconomic characteristics of the area, including issues confronting the sustainable development and use of the bay; the social, economic, and ecological costs associated with a business as usual scenario; and the actions being undertaken and planned by the various stakeholders.

Maps and annotations identifying the location and health of habitats and resources, economic uses of resources in the bay such as tourism and recreation (beach resorts), industry, shipping, ports and fisheries, and the water quality conditions of the bay facilitated the preparation of a zoning plan for the area. Bataan, a coastal province in Manila Bay, utilized the atlas as a resource in the formulation of its CUZ scheme, which was then adopted and is currently being implemented in the province.

Maps presenting the environmental risks and challenges in the bay, particularly with respect to oil spills, sea level rise, and flooding were proving to be a useful resource to concerned government agencies in developing oil spill contingency plans, flood mitigation, and climate change adaptation strategies. In terms of pollution reduction, the map of beach resorts in the bay allowed the identification of priority areas for water quality monitoring particularly levels of bacteriological contamination, and possible management interventions in the form of interceptor sewers and sewage treatment facilities (see Figures 3 and 4).

Figure 3. Computed risk quotient (RQ) for fecal coliform in Manila Bay. RQ > 1 indicates high risk to human health.

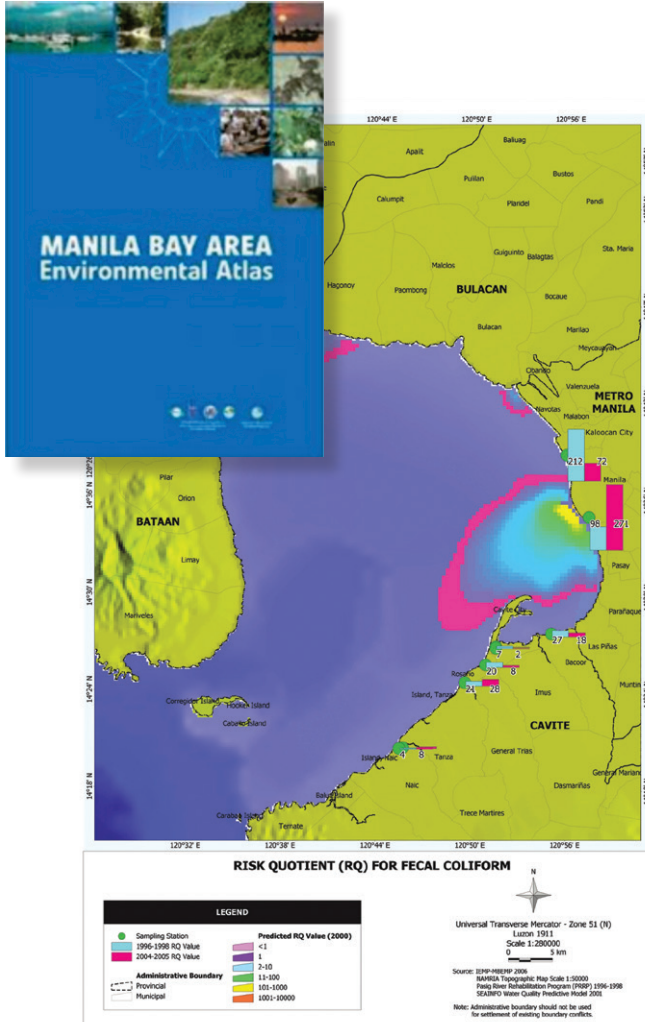
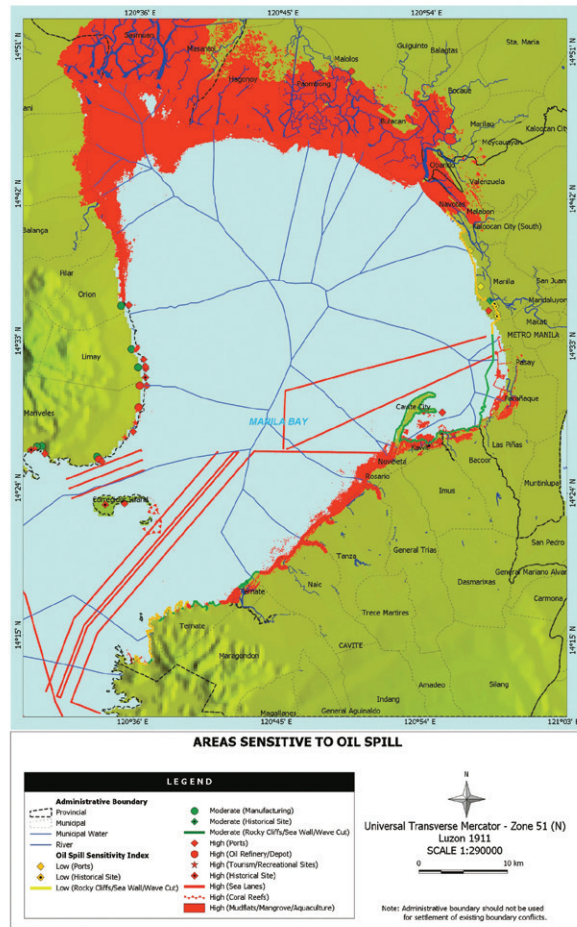


Figure 4. Map of areas in the Manila Bay that are sensitive to oil spills.



One of the most important outcomes of the ICM effort in Manila Bay occurred in December 2008, when the Supreme Court of the Philippines directed 12 national agencies to perform certain functions relating to the cleanup, rehabilitation, protection, and preservation of Manila Bay. The Supreme Court decision stated that the target classification of the bay waters was Class SB (i.e., waters fit for swimming and recreation). The Manila Bay Coastal Strategy, operational plan, integrated environmental monitoring program, and the Manila Bay Environmental Atlas were recognized as key products employed in the

Supreme Court Decision, and in measuring progress toward the identified targets (PEMSEA, 2009).

In 2015, the Manila Bay Coordinating Office of the DENR published the updated Manila Bay Environmental Atlas (DENR-MBCO and NAMRIA, 2015). The updated atlas provides information on changes in socioeconomic and ecological status of the bay, as well as determine the impacts of the various efforts towards rehabilitating the bay, in line with the Supreme Court’s continuing mandamus.

State of the Coasts reports

The provinces of Bataan and Cavite, which published their SOC reports (PEMSEA and PG-Bataan, 2017; PEMSEA and PG-Cavite, 2017), used their IIMS databases as sources of information for their SOCs and as database platform for data and information gathered during the process.

The integrated IIMS database of Manila Bay, which consolidates the IIMS databases of the DENR Regional Offices in Manila Bay (Regions 3, 4A, and NCR) and the provinces of Bataan and Cavite, was also an important resource for the development of models to estimate the pollutant loadings in Manila Bay, as part of the UNEP Project on Global Nutrient Management. The models are important inputs in developing nutrient management and pollution reduction strategies and policies for the cleanup and rehabilitation of Manila Bay. The accuracy of an output of a particular model greatly depends on the availability and reliability of data to be used. Access to Manila Bay data is facilitated by the integrated IIMS database of Manila Bay. The accuracy of the data inputted in the Manila Bay IIMS is ensured by the protocols and guidelines adopted by the IIMS team looking after the operations of the database.

Moreover, in line with the effort to rehabilitate Manila Bay, pollutant and ecosystem models were developed as basis for identifying policy options for the management of the Manila Bay watershed. The integrated IIMS database for Manila Bay facilitated the access of data for use in these models.

Lessons Learned

Accurate information enables sound policy and decisionmaking. ICM addresses a broad range of governance and aspects of sustainable development and hence entails the engagement of multiple disciplines and sectors. It requires a broad range of information, i.e., social, economic, biophysical, and ecological, to support effective management planning and decisionmaking. Sound management decisions

can be arrived at only when quality information that supports them is available. As the case of MBIN, the network promoted coordinated information gathering and sharing for a more cost-effective and comprehensive assessment of the status of Manila Bay.

The stage-wise ICM process facilitates a goal-oriented and systematic data and information gathering. Data and information gathering, however, is a cumbersome process requiring proper planning and goal-setting before embarking on the process. The stage-wise ICM process allows efficient and cost-effective data gathering and ensures that required information for the development of specific output in each stage of ICM implementation is available. The output/s from each stage is critical input to the planning and decisionmaking processes in the succeeding stages of the ICM cycle.

IIMS is an innovative tool in transforming data to relevant information. Computerized database and information management such as the IIMS provides data storage, and analysis and retrieval of information coming from a wide variety of sources on an intermittent (e.g., research projects) and regular basis (e.g., environmental monitoring programs), which can be accessible and available to different users in the area. The database also standardizes data formats facilitating cross-comparison and analysis of data among sites, data providers, and users.

The IIMS facilitated the packaging of data and information into products that can be understood and used by targeted groups of users, from policymakers and decisionmakers to the general public. The Manila Bay Environmental Atlas, for example, is an innovative approach in transforming a broad range of multisectoral data into visually relevant information that guides management decisions while informing the public of current conditions in the bay. The atlas has proven to be an important resource document in the CUZ scheme in Bataan; in developing oil spill contingency plans as well as identifying flood and climate change mitigation strategies and priority areas for pollution reduction and monitoring.

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Appendix

Data and information gathered and analyzed in each stage of the ICM cycle.

CUZ=Coastal use zoning; CSIP=Coastal Strategy Implementation Plan; IEC=Information, Education, Communication; IIMS=Integrated Information Management System; RRA=Refined risk assessment; SAP=Strategic Action Plans; SDCA Framework=Sustainable Development of Coastal Areas; SOC=State of the Coast.

ICM stages	Required output/s	Types of data needed	Description/process of data gathering and development
Stage 1 - Preparing	Rapid appraisal report	<ul style="list-style-type: none"> Demographic characteristics Socioeconomic information Biophysical and ecological information Institutional, political, and governance features Environmental management challenges 	<ul style="list-style-type: none"> Conduct of surveys or interviews with key informants on stakeholders' perceptions, observations, and experiences concerning their community or environment Secondary data/information on biophysical, social, and economic aspects
	Stakeholder analysis report	Stakeholder analysis matrix covering the following: <ul style="list-style-type: none"> Types of stakeholder Interests/activities in coastal management program Impacts to the program Potential interest for obtaining support or reducing obstacles 	<ul style="list-style-type: none"> Generated through stakeholders' consultations or meetings
	SOC scoping report	Data requirements identified in SOC template covering general information about the site and 35 core indicators based on SDCA Framework	<ul style="list-style-type: none"> Identification of data sources and data gaps based on SOC template

ICM stages	Required output/s	Types of data needed	Description/process of data gathering and development
Stage 2 - Initiating	Baseline SOC report	Refer to SOC template	<ul style="list-style-type: none"> Secondary data gathering based on SOC scoping report, including inputs from initial risk assessment, stakeholder analysis, and institutional analysis reports
	IIMS database	<ul style="list-style-type: none"> Coverage of ICM site/geospatial data Demographic data Socioeconomic data Biological and bioresource data Governance data Pollution sources data Environmental quality Physiographic data Water resources data Natural and human-made hazards Natural and cultural heritage Management and financial data 	<ul style="list-style-type: none"> Initial secondary data collected are encoded into the IIMS database Management measures and financial investment (budget) where applicable
	Communication plan	<ul style="list-style-type: none"> Stakeholders <ul style="list-style-type: none"> List of stakeholders and their influence in program implementation Attitude and perception towards environmental management Existing efforts in environmental management Available means of communication Existing feedback mechanism Existing IEC activities in the area and their effectiveness 	
	Initial institutional analysis report	<ul style="list-style-type: none"> Evaluation of coastal and marine resources <ul style="list-style-type: none"> Resources/habitats Values Condition Threats Impacts Political-legal matrix <ul style="list-style-type: none"> Resources Causes/threats Laws/policies and other interventions Implementing agency/ government unit Impacts Success rate Success factor/barrier Social analysis matrix <ul style="list-style-type: none"> Resources Stakeholders Stakes Threatening activities Objectives Driver issues 	

ICM stages	Required output/s	Types of data needed	Description/process of data gathering and development
	Initial risk assessment report	<ul style="list-style-type: none"> • Risk pathways <ul style="list-style-type: none"> ◦ Economic drivers ◦ Agents ◦ Targets ◦ Effects on economy • Retrospective risk analysis <ul style="list-style-type: none"> ◦ Resource type ◦ Year ◦ Area ◦ Agents/causes of change ◦ Impacts • Prospective risk assessment (water quality, sediment quality, tissue analysis, groundwater quality) <ul style="list-style-type: none"> ◦ Parameters <ul style="list-style-type: none"> • Station description • Physico-chemical • Metals • Organics • Algal bloom ◦ Observation ◦ Criteria/standard 	<ul style="list-style-type: none"> • Developed based on analysis of secondary data and stakeholders' consultation
	Coastal strategy	<ul style="list-style-type: none"> • Plans, programs, and projects • Laws, regulations, ordinances, legislations • List of stakeholders and their roles in the development and implementation of the coastal strategy • Environmental, social, and economic issues in the area • Maps 	<ul style="list-style-type: none"> • Developed based on the results of initial risk assessment, institutional analysis, SOC baseline report and stakeholder's consultation • Most data are gathered through secondary data gathering
Stage 3 - Developing	RRA	The initial risk assessment will identify data gaps, which can be collected in the RRA process. These gaps can also be collected during the pilot integrated environmental monitoring	<ul style="list-style-type: none"> • Primary data gathering based on the data gaps identified in the initial risk assessment, which are later encoded into the IIMS database • Stakeholders' consultation is also needed in the completion of the report
	Special technical reports		<ul style="list-style-type: none"> • Issue-specific research to collect more information or verify issues identified in RRA • Inputs in developing strategic action plans for the five sustainable development aspects in the SDCA • Provides data for updating the IIMS database
	Pilot environmental monitoring program		<ul style="list-style-type: none"> • Developed based on the results of RRA, and gives rise to an environmental monitoring program
	Institutional analysis report	<ul style="list-style-type: none"> • <i>See requirements in Stage 2</i> 	<ul style="list-style-type: none"> • Produced based on the RRA, relevant technical reports/studies and stakeholders' consultation
	CSIP	<p><i>Data for CSIP can be gathered from the previous outputs</i></p> <ul style="list-style-type: none"> • Prioritized issues (initial/refined risk assessment) • Existing efforts addressing issues and concerns, including plans and programs (secondary data gathering, IIMS, institutional analysis, SOC) • Enabling laws and legislations (institutional analysis, SOC) • Investment plans (SOC, IIMS) 	<ul style="list-style-type: none"> • Developed based on the priority risks identified in RRA and the outcomes of stakeholders' and interagency consultations

ICM stages	Required output/s	Types of data needed	Description/process of data gathering and development
	SAP/Issue or area-specific action plans	<ul style="list-style-type: none"> • Water use and supply <ul style="list-style-type: none"> ◦ Facilities ◦ Water demand and distribution ◦ Water permits ◦ Water supply and facilities ◦ Water supply and sanitation projects • Hazard management <ul style="list-style-type: none"> ◦ Hazard occurred ◦ Hazard-prone areas • Pollution management <ul style="list-style-type: none"> ◦ Demographic data ◦ Water pollution ◦ Solid waste ◦ Hazardous waste ◦ Treatment facilities 	<ul style="list-style-type: none"> • Developed based on CSIP and stakeholders' consultation
	CUZ scheme	<ul style="list-style-type: none"> • Existing land and water uses • Plans • Institutional arrangements (national, local) • Natural habitat and resources • Maps • Demographic data • Health statistics • Water quality and tissue analysis • Protected areas, national parks, cultural heritage areas • Volume and value of production of economic activities • List of stakeholders and roles in the planning and implementation of CUZ 	<ul style="list-style-type: none"> • Developed based on CSIP, relevant technical reports, stakeholders' consultations and institutional analysis
	<ul style="list-style-type: none"> • New legislations or ordinances that support ICM program implementation • New organizational structures or mechanisms • Environmental monitoring program • CSIP • SAP • CUZ scheme 		
Stage 5 - Implementing	Implementation of adopted items in Stage 4		<ul style="list-style-type: none"> • Results of implementation are encoded in the IIMS database to facilitate monitoring and evaluation • The IIMS is updated as new data are generated resulting from interventions undertaken and changes that are taking place
Stage 6 – Refining and consolidating	<ul style="list-style-type: none"> • Updated SOC report 		<ul style="list-style-type: none"> • Developed based on the results of the implementing stage, which have been stored in the IIMS database

Harnessing the Power of an Informed Public for Coastal Management

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Key Message

- Start with the people and their priorities. It is important to address the main concerns of the community first before progressing to project activities. Project managers must be cognizant of the realities and immediate concerns of the communities they are working with. They should operate within existing social, cultural, political conditions, and institutional structures.
- Customize a strategy and plan for effective communication. The communication plan provides the rationale, objectives, expected outcomes, and strategic guide for effectively implementing information sharing and knowledge across different sectors of the community (Chua, 2006).
- Tailor-fit information sharing and interactions. In order to communicate effectively, information strategies and public awareness campaigns need to be created in formats and languages that are understood by the intended audiences.
- Create platforms for consensus-building, partnership, and public engagement.

Providing a platform for the local government, the general public, and other major stakeholders to interact, plan, adopt, and implement is one of the key targets of an ICM program.

Abstract

An informed public is critical to the implementation and sustainability of integrated coastal and environmental management programs. On one hand, an informed public can push forward the implementation of projects or programs that are seen to be beneficial to the environment and to the community. On the other, they can also halt a project if perceived to be detrimental to the environment and to the community.

Creating an informed public goes through different stages, starting from a stage of being unaware and uninvolved to a stage of active engagement. Experiences from various ICM sites, as presented in this case study, provide examples on the different strategies that were employed to build an active and engaged community.

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The case of Preah Sihanouk Province in Cambodia showed how the engagement of the community in environmental management was developed by first addressing their basic needs and, through the process, instilling in them the need to go beyond the confines of their homes and care for the environment. In Bali, Indonesia, incorporating the traditional values and beliefs, such as the *Tri Hita Karana* (Three Ways to Harmony) in the ICM programs and objectives allowed the stakeholders to better appreciate and get involved in the program. The creation of an interactive platform, provided a venue for the local government, the general public, and other major stakeholders to interact and plan together and worked well in supporting the implementation of the ICM program in Chonburi, Thailand.

In a different spectrum, the cases of Xiamen (PR China) and Guimaras (Philippines), presented in this case study, showed how an informed public was able to halt the building of a petrochemical plant and large-scale mining operations that posed threats to the environment and health of the people.

Background

In integrated coastal/environmental management, an informed public is critical to the implementation and sustainability of projects and programs. In contrast, a public that lacks the knowledge and/or is misinformed can be a hindrance to any program or may cause its termination even before its benefits could be realized.

A nonparticipating public poses serious risks to ICM programs. These risks include:

1. discontinuation or termination of a program or policy with public's noncompliance, lack of support, or through active clamor for stoppage due to misinformation;
2. retention of an undesirable status quo (e.g., continuing harm to the environment from the public's destructive practices, whether they are conscious of this or not);
3. contribution to intersectoral conflicts as a result of wrong information or being misinformed;
4. increased costs of enforcement from noncompliance; and
5. causing change in political leadership through the power of electoral votes. This may be advantageous for flawed politicians but disadvantageous for exemplary leaders who have invested in environmental programs which have long-term benefits that may not be so obvious in the short-term.

Making a conscious effort to optimize the public's latent contributions can create huge impacts on project or program outcomes. An informed public can facilitate project and program objectives and implementation with the following actions:

1. voluntary participation in management interventions designed to restore and protect the resources, livelihoods, and security, with full knowledge and understanding why changes are needed; providing solid and effective public information is a soft enforcement approach bringing down the costs for hard enforcement;
2. serving as guardians of natural resources and ecosystems against illegal and destructive practices or new projects or policies that could threaten advances made in improved governance and sustainable management of the area;
3. advocating changes in behavior in a community or community group (e.g., volunteerism/participation in information, education, communication (IEC) activities; providing skills, materials and equipment in order to accelerate planning and implementation processes; inviting/influencing other stakeholders within the sector to participate); and
4. creating an enabling environment of cooperation, contribution and co-management of their environment.

This case study delves into how an informed public was created through the different strategies employed in ICM program implementation, in Preah Sihanouk, Cambodia; Chonburi, Thailand; and Bali, Indonesia. The cases of Xiamen, PR China, and Guimaras, Philippines, show how the power of an informed public can influence and reverse management decisions to support sustainable development of coastal and marine areas.

Approach and Methodology

Over two decades of experiences in ICM implementation provide useful examples of the different strategies by which an informed public was developed. While strategies varied, general approaches included educating stakeholders on the environmental and ecological conditions in their localities and engaging them in effective management planning and capacity-building activities that supported the implementation of policies and regulations relevant to ocean and coastal management.

In an ICM program, public awareness campaigns are launched, not only to educate the public, but also to entice them to participate and contribute to ICM projects and programs, using available resources in their communities.

Processes and strategies for creating an informed public

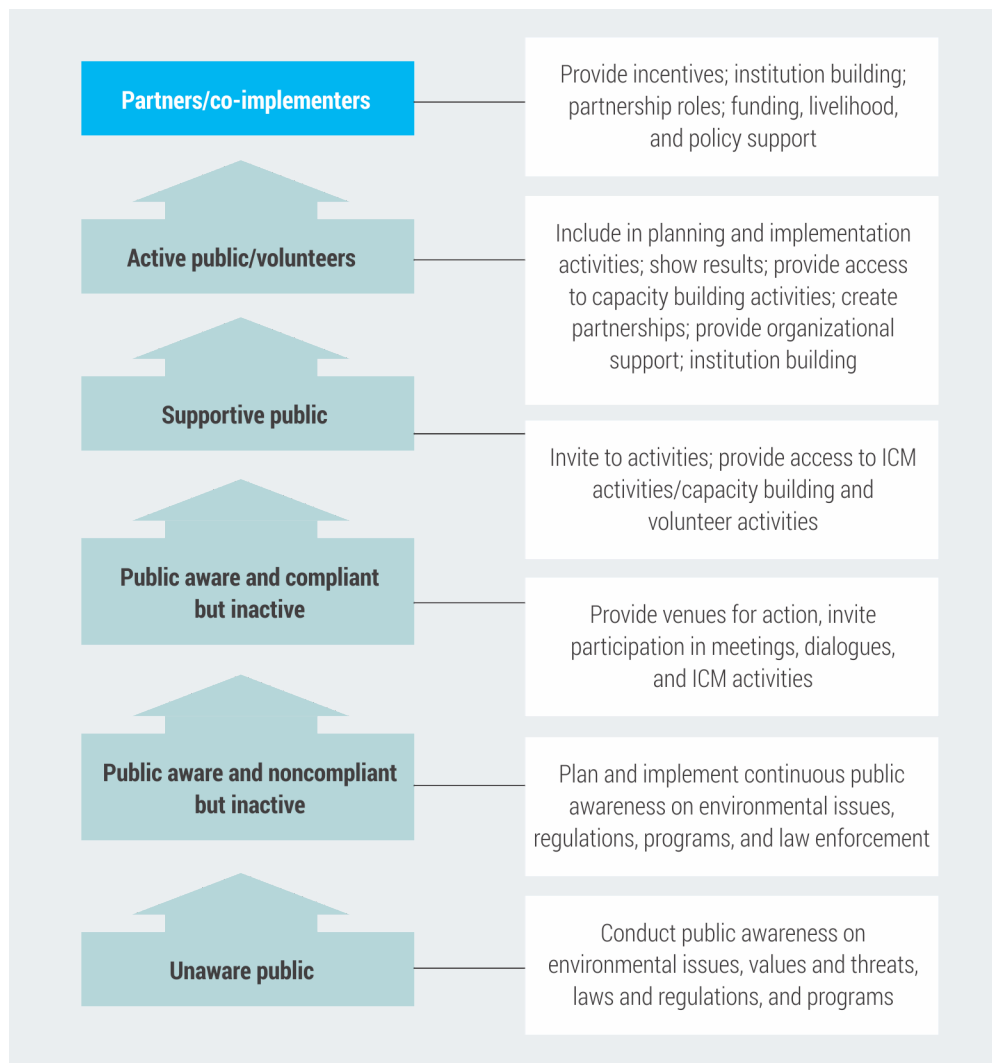
The creation of an informed public goes through a series of processes or stages, starting from a stage of unawareness to one of active engagement. The experiences in the PEMSEA ICM sites revealed that certain elements should first be introduced to the concerned public, followed by strategic engagement in a series of learning experiences which eventually lead to transformation to collaborative partners for change (Figure 1).

For strategies to be effective, they must be tailored to the specific public that will be engaged. It is

important to consider the appropriate strategies and tools to be used in providing accurate and easy to understand information that allows people to believe and translate their beliefs into action.

Throughout the different stages of creating an informed public (Figure 1), PEMSEA ICM sites undertook various strategic activities to share information, impart knowledge, and engage the public. Some activities were innovative; some were common but all were just as effective. These activities included:

1. promoting interaction and dialogues with local community leaders in planning and implementation of ICM programs;
2. linking environmental management concept and practices, where appropriate, to local or traditional beliefs and practices regarding human and nature;
3. organizing workshops, study tours, and capacity building programs for stakeholders and volunteers from the public sector;
4. initiating regular forums, seminars, or dialogues among the various partners/sectors involved in ICM programs (e.g., waste segregation, beach cleanups, etc.);
5. incorporating science and technology information into the decisionmaking process; ICM programs supported by scientific data increased volunteerism/contributions among stakeholders and the public sector, particularly when benefits were documented and scientifically proven;
6. building early environmental advocacy through the publication of textbooks for middle school and incorporation of environmental education in the school curriculum;
7. producing environment-related publications and distributing public awareness materials, such as posters, newsletters, and flyers;

Figure 1. Stages and strategies of creating an informed public.

8. optimizing the utilization of communication channels, including print and broadcast media (radio and TV), mobile phones (through short messaging service or SMS), and the Internet/social media networks in the promotion of programs and projects;
9. conducting inter-community competitions on green production and environmental protection (e.g., *Tri-Hita Karana* Awards for Tourism in Bali), youth activities, and artistic festivals; and
10. engaging the public to join in program activities such as coastal cleanups, mangrove planting, protected area activities, waste segregation activities, and sea turtle conservation.

Effective public engagement

Start with the people and their priorities. It is important to address the main concerns of the community first before progressing to project activities. Project managers must be cognizant of the realities and immediate concerns of the communities they are working with. They should operate within existing social, cultural, political conditions, and institutional structures.

In Preah Sihanouk, Cambodia, the ICM program dealt with the compound issues of poverty, dwindling fish catch, resource use conflicts, degradation of resources, and expansion of infrastructure from large-scale industries. The ICM Project Management Office (PMO) realized the difficulty of engaging the locals in discussions on

environmental management, much less sustainable development. The locals, who were faced with their own problems of addressing basic survival needs, were also lacking in environmental awareness. To get the locals on board with the ICM program, it was essential to start educating them. IEC activities became the first order of business (Figure 2). Field activities, one-on-one training, community-based teaching, and basic skills training were conducted, and as much as possible with provision of access to livelihood support. With this approach, a sense of ownership and responsibility was gradually instilled. As local knowledge and acceptance of environmental management increased and basic needs were addressed, the locals began engaging in community activities that concerned issues beyond the confines of their own homes (Rafael, et al., 2010).

Customize a strategy and plan for effective communication. The communication plan provides the rationale, objectives, expected outcomes, and strategic guide for effectively implementing information sharing and knowledge across different sectors of the community (Chua, 2006). First, it defines target audiences and clarifies desired relationships as a result of communication. Second, it determines key messages to be conveyed to target audiences. It clarifies the communication outcomes and objectives. Third, it provides a set of communication strategies and key activities to achieve the communication objectives. Finally, it defines the indicators and means for evaluating the effectiveness of communication activities.

The communication plan developed in Chonburi, Thailand, identified specific target audiences and specific messages and strategies for each target audience. For example, the plan included time-bound communication strategies to reach the youth, teachers, fishers, restaurant owners, and leaders, and identified the content of the messages to be communicated, the channels of communication, and the frequency of the activities to ensure that the different sectors were informed. The plan also solicited their support for specific initiatives within the ICM program.

Tailor-fit information sharing and interactions. In order to communicate effectively, information strategies and public awareness campaigns need to be created in formats and languages that are understood by the intended audiences. This takes into account the culture, beliefs, values, and context of the area of the target community groups backed by scientifically sound information that has been “translated” into words that the community of stakeholders can understand.

In Denpasar, Bali, Indonesia, one of the strategies in successful ICM implementation was to incorporate traditional beliefs and values into the ICM program and its objectives. While the area was undergoing tourism development, it was facing serious environmental challenges, such as pollution, threats to sacred areas, human activities that led to deterioration and degradation of coastal ecosystems, rapid



Figure 2. IEC activities in Preah Sohanouk (left-right): Local community members participating in cleanup activities; the ICM PMO training the local community on solid waste management; and getting the younger generation involved in simple activities, such as waste management, instills positive habits.

urbanization, and the increased threat of natural disasters (e.g., storms, sea level rise, tsunami), to name a few. To encourage public engagement, the local government integrated the *Tri Hita Karana* philosophy, which emphasizes the relationships between human and society, the environment and God, into the ICM program. Members of community-based organizations were educated in the importance of preserving and conserving coastal and marine resources, so that they, in turn, could pass on this knowledge to village elders and their respective villages. The increase in public awareness and engagement of the elders and villages in ICM initiatives led to a number of positive effects, including (Sudiarta, 2012):

1. implementation of waste management programs for domestic waste in villages, schools, and communities;
2. reduction in destructive fishing practices, with local fishers becoming guardians of coral reefs;
3. participation in the startup of eco-friendly livelihoods, such as marine tourism, fish processing, seaweed culture, and setting up of small community cooperatives to sell fishery products; and
4. engagement of hotels in good environmental management practices and the establishment of the *Tri Hita Karana* Awards for Tourism.

Create platforms for consensus-building, partnership, and public engagement. Providing a platform for the local government, the general public, and other major stakeholders to interact, plan, adopt, and implement is one of the key targets of an ICM program. In Chonburi, Thailand, for example, the creation of a multisector coordinating mechanism facilitated improved working relationships among senior officials of provincial and municipal governments, government

departments, academic and scientific institutions, NGOs, private sector, fisherfolk, students, local communities, and the public in general. The mechanism provided a forum for consultation, planning, and decisionmaking, resulting in a harmonized and rationalized coastal strategy which all government agencies and municipalities were able to use as their roadmap for environmental action (Kanchanopas-Barnette, et al., 2012).

The mechanism also resulted in the establishment of networks and partnerships with the universities and research institutions in the province providing scientific information to enhance environmental awareness and understanding by the locals. With improved local knowledge and a better sense of environmental responsibility, the local communities contributed by participating in environmental activities and projects within the ICM program (Figure 3).

Figure 3. Community activities in Chonburi include mangrove rehabilitation projects.



Results

Heightened public awareness and an involved public uphold the objectives of ICM. Engaging the public in targeted IEC programs resulted in the public's enhanced awareness, participation, and ownership of the ICM program.

The case of Xiamen, PR China

In 2006, the national government of the PR China entered into a joint venture with a private company from Taiwan to build a billion dollar chemical factory in the Haicang District of Xiamen Province. Driven by the huge economic potential of the project that would possibly rake in billions of dollars, all environmental concerns took second seat. The planned petrochemical plant, which aimed to produce a highly polluting chemical (i.e., paraxylene), posed a threat to human and environmental health, not only to the 100,000 residents in the district but to the 3.5 million population of Xiamen (Cody, 2007; Dagong, 2007; Blount, 2011).

Xiamen was implementing an ICM program since 1994, and the public was well aware of the benefits of a healthy coastal and marine environment (Figure 4; Xiamen Municipality and PEMSEA, n.d.). Residents came together and protested against the proposed plant, requesting the withdrawal of the project from Xiamen. The academic sector together with the Chinese People's Political Consultative Conference (CPPCC) composed of experts and scholars submitted a proposal for the relocation of the plant. This was soon picked up by local media and national newspapers. Also, SMS (text) messages, blogs, and web-based forums were

used to spread information and protest against the plant (Cody, 2007). Street demonstrations ensued, attended by thousands, eventually forcing the municipal government to rethink its stand through the creation of a new group to conduct environmental impact assessment (EIA) (Dagong, 2007; Blount, 2011).

Bloggers and text campaigners strengthened the resolve of the society that was used to following orders and feared protesting against the government. They provided information on the plant and its detrimental effects on health and the environment and encouraged spreading the word to more people. Banners, posters, slogans, and continuous journals, blogs, and articles in media proliferated.

Finally, in December 2007, after a review of the EIA and a public hearing where the majority opposed the project, the plant ceased operations in Haicang, Xiamen. It was eventually relocated to another city in PR China (China Daily, 2007; Shanghai Daily, 2007).

In this case, public clamor and the resulting decisions were very much built upon the long-term public awareness initiatives facilitated by an existing ICM program, not only providing a clear vision for achieving the goals of coastal development, but also the appropriate policy direction, coordinating mechanism and long-term strategy and action plans, the implementation of which highly relied on the support of the general public (Figure 4).

Figure 4. Xiamen regularly holds coastal cleanup activities.



The case of Guimaras, Philippines

The island province of Guimaras, Philippines, is best known for its natural resources, beaches, and tourism potential, and its world-class mangoes. The province initiated the implementation of an ICM program in 2008 and is a member of the PEMSEA Network of Local Governments for Sustainable Coastal Development (PNLG)—a network of local governments in the East Asian Seas region (PG-Guimaras and PEMSEA, 2012).

In 2008, large-scale mining companies were attracted to the province. These companies submitted mining exploration applications to the Department of Environment and Natural Resources (DENR). The applications, which did not need the approval of the local governments, covered over 65–80% of the land area of the island province, potentially threatening 84 of the 98 villages in the province.

Still reeling from the effects of a two-million liter bunker oil spill along the coasts of Guimaras in 2006, which displaced thousands of residents and affected their coastal and marine resources, the governor at that time took a very strong stand against the mining application. Concerned about the potential permanent impacts of the large-scale mining operations, the governor launched a series of information campaigns in the villages on potential impacts on the people's health and the environment, and urged them to take a stand against the project (Burgos, Jr., 2008).

Together, church leaders, NGOs, residents, and people's organizations continued with information dissemination and education campaigns, and posted stickers and streamers throughout the province. The group conducted signature campaigns and organized a multisectoral assembly to increase pressure on DENR to stop issuing mining permits and applications in the province.

All these efforts forced the DENR to consider the opposition of the residents and officials, and made it a factor in their decisions on the mining issue in Guimaras. Their efforts snowballed and prompted five congressmen to urge the House of Representatives to issue a house resolution supporting Guimaras in its stand against mining (HR 841). Further strengthening their stand, an Executive Order (EO 79, 2012) of the then president outlined its mining policy, which included the exemption of island ecosystems, tourism destinations, and marine reserves from mining applications (Burgos, Jr., 2012). Apart from these, the then governor also stated that being part of PNLG, they could rally the support of other PNLG members from the other nations in the EAS region.

The public clamor and the resulting decision was made easier by an existing ICM program which sets clear visions and targets, an operational plan, and local capacity development for the long-term implementation of a series of management measures.

Lessons Learned

- 1. Call for cooperation and action by the public.**
The creation of venues and activities for the public to engage in helps to instill a sense of ownership and responsibility. These can include coastal cleanups, tree planting, environmental monitoring, contests, dialogues, etc. In all of the cases cited previously, the ICM programs created various environmental events and activities wherein the public was actively engaged.
- 2. Show proof of program and project gains.**
This will also help entice others to participate in implementing and/or sustaining ICM programs. The flow of continuous information on program updates, decisions, and actions

keeps public interest and acceptance. While it may be challenging to get the people interested in ICM, it takes extra effort to keep them in the program over the longer term. For example in Chonburi, Thailand, venues and activities to engage the youth in conservation projects were undertaken. Educational field trips, mangrove planting excursions, and seagrass planting activities for school children paved the way to stronger partnerships between the schools and government. The schoolchildren themselves became advocates, sharing their experiences with the local communities. Their seagrass project, which was conducted for several years, served as a demonstration project to raise awareness on the value of the resource. It also inspired the participation and partnerships with universities for technical support, municipal governments, municipal schools, local fishers, and fishing communities.

3. **Work in stages.** Pursuing a combination of short, medium, and long-term strategies enables the public to better appreciate the benefits from ICM implementation. Start with the immediate or pressing issues and progress into more complicated issues.

In Cambodia, a valuable lesson learned and practice was that building local capacity should be done a little bit at a time, starting from the simple concepts then progressing to the more complicated and bigger issues. Faced with a public with low awareness and interest and difficulty in understanding technical matters, the ICM PMO in Preah Sihanouk sensed the locals' receptiveness and willingness to participate when they were taught in stages, being provided the basic information and skills first and on issues that concerned them, then gradually involving them in community initiatives.

Locals were engaged in ICM implementation in three stages: first, they introduced practical approaches to livelihood, protection of resources, and basic organizational management; second, they started addressing issues on water supply and access to safe water, including training on water reservoir rehabilitation; and third, they tackled the more complicated issues of management of water reservoirs and integrated waste management.

In three years, the ICM program in Preah Sihanouk built the capacities of 779 individuals on the various technical programs, environmental concerns, and organizational needs. More than building their knowledge and skills, the program changed the way of thinking and behavior of these individuals and their families.

4. **Embed the creation and operation of an informed public within the ICM program.**

The ICM framework and process provides an institutional structure, defined roles and responsibilities, a strategic management plan, policies, laws and funding mechanisms, reinforced by support programs including capacity development, partnership building, and monitoring and reporting. Each stage of the ICM process involves actions and outputs that can help transform the public from a condition of lack of concern or awareness to one of active engagement.

One size does not fit all, and for communication plans to be effective, they must be tailored-fit to the specific public that one wants to engage or change behavior. It is critical to study the appropriate strategies and tools to provide information, to help the public understand and believe in the information, and to translate their beliefs into action.

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Promoting Effective Information Management through Academic Partnership: the Case of Batangas Province, Philippines

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Key Message

- Involving an appropriate academic institution at local level as a stakeholder partner can contribute to effective coastal governance and management, including strengthening the quality, use, and management of local information.

Abstract

The storage, retrieval, and access of large amount of data/information accumulated from a number of years of ICM implementation in Batangas Province, Philippines was facilitated by an operational integrated information management system (IIMS). However, the operationalization of the IIMS database in the province was constrained by the limited number of staff in the ICM coordinating office.

The province explored a new modality of operationalizing the IIMS database by partnering with De La Salle Lipa (DLSL), one of the local academic institutions in the area. DLSL was able to provide the needed human and technical resources in operationalizing the system and at the same time strengthen its role as an ICM Learning Center in the Philippines.

A partnership was initiated to build the capacity of DLSL in operationalizing the Batangas IIMS database. Other local governments, including the Provinces of Bataan, Cavite, and Guimaras found the partnership beneficial. In turn, they were engaged in discussions with local academic institutions in their respective areas to replicate the initiative.

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Background

With more than two decades of ICM implementation, Batangas Province was accumulating a large amount of data/information. An operational IIMS was provided to facilitate storage, retrieval, and access of these information to support planning and decisionmaking processes and activities relevant to coastal and river basin management of the province (see Box 1).

The IIMS database was initially established at the Provincial Government-Environment and Natural Resources Office (PG-ENRO)¹ in 2005 as a decision support system for the Batangas ICM program. With its limited staff, the number of activities and the amount of responsibility required in coordinating the ICM program, PG-ENRO was faced with the challenge of populating the data tables, and of updating and maintaining the IIMS database. While PG-ENRO recognized its importance in ICM program implementation, the lack of human resource was impeding the operationalization of the IIMS database of Batangas.

Local and national scientific and academic institutions were long involved in the ICM program to assist the province in the identification of policy options and appropriate

management interventions for the sustainable development of its coastal and marine areas. The academe was the partner of the local government in the conduct of relevant research studies (e.g., connectivity studies on marine protected areas; see Sollestre, et al., this volume), and in the preparation of outputs required in the ICM program (e.g., coastal environmental profile, setting up of the environmental laboratory, assessment of marine protected areas).

The interest of local academic institutions to partner with the local government stemmed from the fact that they were also stakeholders and users of the area. As with other stakeholders, local academic institutions recognized the need to contribute to the management and sustainable development of coastal and marine resources.

Information management and dissemination was another aspect that was explored by the local governments to collaboratively work with academic institutions, which were perceived by stakeholders to be credible, objective, and impartial and not producing results that were “self-serving” to the government. Thus, reports and outputs produced with, and information disseminated by, academic institutions were viewed as accurate, reliable, and neutral.

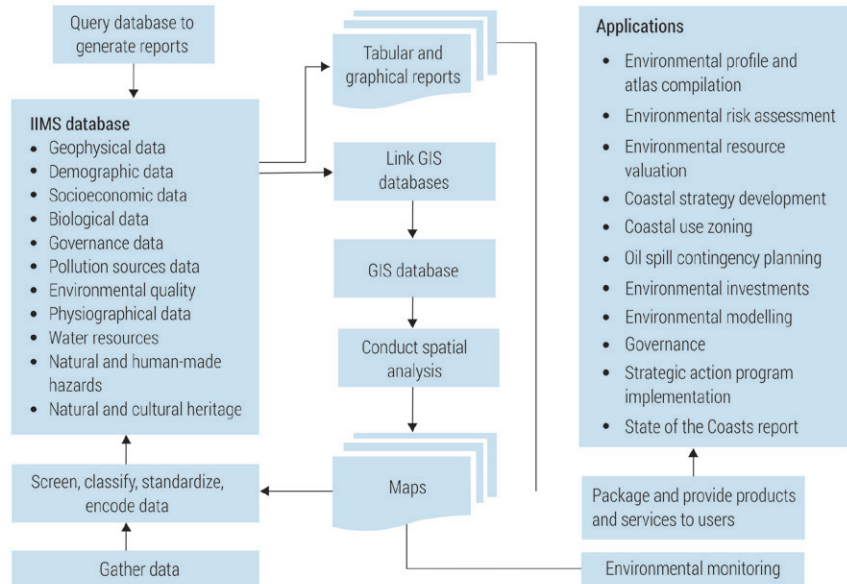
¹ The PG-ENRO serves as the Secretariat and coordinates the implementation of the ICM program in Batangas. The ICM program in Batangas was initiated in 1994.

Box 1. Integrated information management system

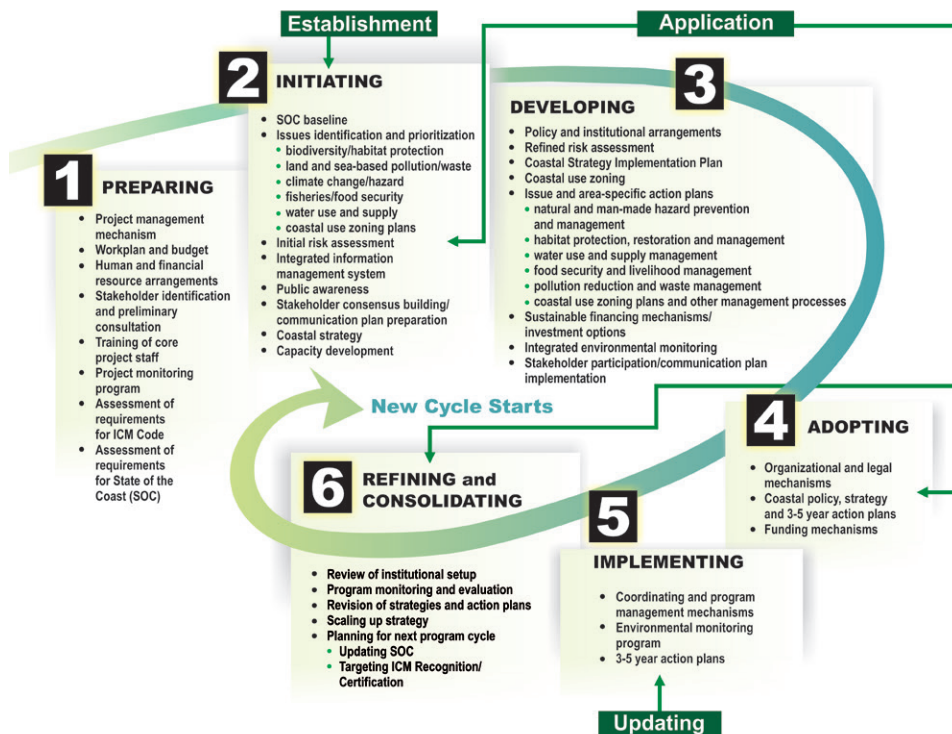
The IIMS is a comprehensive relational environmental database that allows users (e.g., local governments, government agencies, academe, and other relevant stakeholders) to store, retrieve, and generate information supporting the implementation of integrated coastal and river basin management.

The IIMS captures 11 categories of data and generates information relevant in producing the different outputs and supporting various applications in coastal and river basin management.

The IIMS is a tool for local governments implementing ICM. Its establishment begins during the initiating stage of the ICM development and implementation cycle. At each stage of implementation, it generates information supporting various coastal and river basin management activities (e.g., risk assessment, resource valuation, state of the coasts reporting, land and sea-use planning, coastal strategy development, etc.). The IIMS has to be updated as data/information become available in the different stages of ICM implementation.



PEMSEA developed a modular approach for the IIMS training. Module 1 discussed the requirements in the establishment and basic operations of the IIMS. After the training, participants were expected to establish and populate the data tables of the IIMS database in their respective areas. When the data tables were populated, Module 2 on query system and linking the IIMS to external software (e.g., GIS) was conducted.



Approach and Methodology

Expanding academic partnership for information management

Early on, IIMS was developed by PEMSEA solely for local governments to maintain, update, and sustain data and information to support ICM program implementation. Adapting to the realities on the ground, Batangas Province embarked on exploring a new modality to operationalize the system. The province engaged DLSL, one of its local partner universities in ICM program implementation for the operationalization of its IIMS database.

The DLSL was established as one of PEMSEA's ICM Learning Centers in the Philippines in 2008. As a learning center, DLSL was serving as a repository of information and reference materials, training modules, tools, and methodologies relevant to coastal management. It was also expected to provide technical assistance in the conduct of training and other capacity building activities in support of ICM program implementation among local government units in the country, particularly in Batangas where it was located. With the new arrangement, DLSL was providing the necessary human and technical resources required to update and maintain the IIMS.

The DLSL, on the other hand, was perceived to benefit from the arrangement by an expansion of its community outreach activities and the possibility of developing research studies from the information generated from the system.

Likewise, the local government and other stakeholders were seen to benefit from the arrangement through improved access to information supporting sound management decisions and informed planning in coastal and river basin management activities.

Results

Initiating the new partnership

A series of discussions was undertaken among PG-ENRO, DLSL, and PEMSEA to agree that the proposed arrangement was feasible and would result in benefits for the province and its stakeholders. The discussions were also used to delineate roles and responsibilities, including human, financial, and technical resources required from the three parties in re-establishing and operationalizing the Batangas IIMS database (Box 2).

A Memorandum of Agreement (MOA) was signed between PG-ENRO, DLSL, and PEMSEA on 26 March 2014 during the Batangas Environment Summit 2014 to re-establish and operationalize the IIMS database of Batangas Province. The Provincial Governor of Batangas, the President of DLSL, and the Executive Director of PEMSEA represented the parties in the collaborative arrangement and signed the MOA (Figure 1).

Training the IIMS core team

Following the signing of the MOA, the IIMS core team was trained on the operations and applications of IIMS. The team of DLSL consisted of faculty members and staff from the Biology Department and Science Area of the College of Education, Arts and Sciences, and the Information and Communication Technology Department (Figure 2). The composition of the IIMS core team was based on the requirement for technical staff who are knowledgeable and understand the data requirements of IIMS, and an administrator who is knowledgeable in computer and Internet operations.

Figure 1. Signing of the MOA on the establishment and operationalization of the IIMS database of Batangas Province.**Box 2. Roles and responsibilities for the establishment and operation of the Batangas IIMS database****Batangas PG-ENRO****Operationalization of IIMS**

- a.) Facilitate the conduct of various training programs necessary in establishing, maintaining and updating IIMS.
- b.) Allocate human and financial support (e.g., venue, accommodation, and food) for the conduct of various training programs and workshops in relation to the establishment and operations of IIMS.
- c.) Facilitate data collection and consolidation of data from relevant national and provincial government agencies, municipal LGUs and other sources.
- d.) Coordinate with municipal LGUs and relevant national and provincial agencies for regular submission of data and updates in relation to the operationalization of IIMS.
- e.) Submit new data to DLSL after initial screening and quality control.

Data access and use

- f.) Review request for access to the IIMS database from various stakeholders and provide DLSL with clearance notice for data access.
- g.) Provide assistance to municipal LGUs and other stakeholders on IIMS-related concerns subject to guidelines and protocols on access to information.
- h.) Review and evaluate data generated through IIMS for strategic planning, monitoring purposes, status updates, and other decisionmaking applications.

De La Salle Lipa

- a.) Allocate resources required for the establishment and operations of IIMS (e.g., hardware and work station, human resources for regular updating of the database).
- b.) Do data encoding and updating of the Batangas IIMS.
- c.) Do regular backup of database and maintenance of IIMS facilities (e.g., computers, printers, peripherals, etc);
- d.) Administer the continuous operation and management of the Batangas IIMS database.
- e.) Make available the IIMS database to PG-ENRO and DLSL and to other data users subject to clearance from PGENRO.

PEMSEA

- a.) Provide IIMS software, manuals, and guides.
- b.) Conduct training courses for the establishment and applications of IIMS in Batangas.
- c.) Provide technical support in the operationalization and trouble shooting of IIMS in Batangas
- d.) Configure the IIMS system for web-based applications.



Figure 2. Training of IIMS core team.

In May 2014, initial sets of data for screening, classification, and encoding were turned over by PG-ENRO to DLSL. Data from 2008 to 2013 were set to be the priority for encoding, in view of the requirements for the updating of the Batangas State of the Coasts report², one of the immediate applications of IIMS in the province.

In populating the IIMS data tables and the operationalization of the database, guidelines and protocols on data collection, encoding, validation, and access were developed and agreed to by the concerned parties. The guidelines and protocols outline the steps in ensuring accuracy and integrity of the database, and the proper use and dissemination of information and outputs generated from the database.

A Facebook³ group was also set up to facilitate online discussions and technical support for the operationalization of the Batangas IIMS database. The Facebook group was maintained by PG-ENRO.

From April to September 2014, the IIMS core team of DLSL with assistance from their students, embarked on populating the tables of IIMS using

data provided by PG-ENRO. Students of the Biology Department under the supervision of the IIMS core team, assisted in data screening, classification and conversion to formats and units required in the database.

A modular training approach was initiated to support the IIMS development. IIMS data tables were populated following the IIMS Module 1 training. Thus, data of the respective local governments and organizations were utilized for the hands-on exercises for the Module 2 training. The Module 2 training tackled the query system and linkage of IIMS to a geographic information system (GIS). Likewise, it provided hands-on training in generating summary tables, graphs, and maps that were utilized in various applications for coastal and river basin management.

Making the IIMS database work

Populating the IIMS data tables was no easy task. With the amount of data and information in various forms and formats that were turned over by PG-ENRO to DLSL for encoding, the screening, classification, and conversion of data required significant time and human resources. The DLSL IIMS

² The first SOC report of Batangas Province was published in 2008 and covered data from 1990 to 2007 (PG-Batangas and PEMSEA, 2008).

³ A social media networking site (www.facebook.com).

core team, being faculties in environment-related disciplines, found opportunity in promoting the review of the Batangas data as part of the research work of their students. Such scheme facilitated the task of the IIMS core team in data encoding.

Close interaction among DLSL, PG-ENRO, and PEMSEA was important in putting the Batangas IIMS database in full operation. Regular correspondence was carried out by the concerned parties to monitor the progress of database updating, including challenges and difficulties that need to be addressed.

The partnership between Provincial Government of Batangas and DLSL in operationalizing the province's IIMS database has progressed accordingly. The IIMS core team encoded the data of the Batangas ICM program, so that these can readily be accessed to support important activities such as updating of the SOC report of Batangas Province and preparation of the State of the Batangas Bay Watershed.

When the Batangas IIMS database is fully operational, it is anticipated that access to information to support sound planning and decisionmaking will be facilitated.

Lessons Learned and the Way Forward

A working relationship between a local academic institution and a local government carries benefits to both parties. In the case of Batangas, the local government benefited

from information gathering, processing, interpretation, for use in policy development decisionmaking and management of the coastal areas. The academics were able to learn and better understand management complications and appreciate the types and level of information needed by the policymakers and managers for addressing coastal management challenges. In addition, the involvement of the local academics in the ICM process not only deepened their knowledge of local management issues as stakeholders but also helped them find scientific and technological solutions. The involvement of academic institutions further strengthened working relationship with government agencies and also directed their contributions to local planning, development, and capacity building in integrated information management.

Other ICM sites in the Philippines, i.e., Cavite, Bataan, and Guimaras found this new working arrangement worth pursuing. In 2016, Cavite Province, Cavite State University, and PEMSEA agreed to pursue such collaborative arrangement through a Protocol Agreement to establish and operationalize the province's IIMS database. Guimaras Province discussed with Guimaras State College and the latter agreed to host the province's IIMS database. Bataan Province will also try to work out a similar arrangement with Bataan Peninsula State University.

ICM implementation together with the different tools are dynamic and adaptive but it should consider the realities on-the-ground and explore options and opportunities to make ICM work. Such is the case of the Provincial Government of Batangas' partnership with DLSL in operationalizing the IIMS database.

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Financing Mechanisms and Economic Instruments to Leverage ICM Program Implementation and Sustainability: Experience from Xiamen and Batangas

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Key Message

- Sustainable financing is an important component of governance within an integrated coastal management (ICM) system. It emphasizes that specific attention is required from different stakeholders for ICM program sustainability.
- Government budgetary allocation is still the main financial resource for ICM-related investments although other financial mechanisms and economic instruments, such as user fees and permit systems, also generate significant income.
- Common vision, coordinated and integrated approach, and stakeholder participation are important elements towards building collaborative opportunities with private and business communities through public-private partnerships (PPP) and corporate social responsibility (CSR).

Abstract

ICM implementation is often initiated with the use of external funding from donors and other external funding agencies. The challenge lies in sustaining the implementation of the ICM program after resources from external sources have ended. Lack of continuing funds has been frequently used as an excuse for inaction and even discontinuation of the program. A sustainable financing mechanism was therefore included in PEMSEA's governance framework for an ICM system. It was included to put additional focus on the need to generate a continuous supply of funds for management interventions and maintenance of environmental improvement infrastructure (Chua, 2008). The ICM system enables the identification and selection of appropriate options for developing sustainable financing mechanisms including regular government budget allocation, user fees and taxes, and PPP.

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This case study identifies the enabling conditions which facilitated initial and continued investments of ICM initiatives using the Xiamen and Batangas experience; in particular identifying various sustainable financing options and economic instruments used at these two ICM sites. The analysis recognizes the role of international interventions in providing conceptual and technical support, as well as limited financial resources, while local government commitment remains key to ICM sustainability. The ICM system provides the framework and process to enable: (a) application of appropriate sustainable financial mechanisms and economic instruments (e.g., regular government budget allocation, user fees, taxes, permit and user fee system); (b) identification and implementation of collaborative opportunities (e.g., cooperation with private sector); and (c) leveraging external resources (e.g., foreign-aided environmental investment projects), to augment the required financial investments.

Background

The ICM system was initiated more than 20 years in the East Asian Seas region. To date, all ICM sites of PEMSEA member countries were able to continue implementing their ICM programs, although varying in terms of level and maturity. Innovative, sustainable financing was a key ingredient to ensuring the needed human and financial resources to implement action plans to achieve long-term goals and targets.

Two selected ICM antecedent projects of PEMSEA (i.e., first phase - Regional Programme for the Prevention and Management of Marine Pollution in the East Asian Sea [MPP-EAS]) in Xiamen, PR China and Batangas, Philippines were implemented from 1994-1999, with direct financial and human resources from the concerned local

governments and partial financial and technical support from the Global Environment Facility (GEF)/United Nations Development Programme (UNDP)/International Maritime Organization (IMO). These two sites were able to maintain and scale-up their ICM programs, even after the initial project was completed.

The success of the first two ICM sites led to the establishment of ICM demonstration sites in Cambodia (Sihanoukville), PR China (Dongying), DPR Korea (Nampho), Malaysia (Port Klang), Philippines (Bataan), Thailand (Chonburi), and Viet Nam (Da Nang) during the second phase of the Regional Programme on Building PEMSEA (1999-2007). In the second phase, much of the financial and human resources were from the respective local governments or jointly from other nongovernment sources, with basic support from PEMSEA for capacity development, essential equipment, travel, and some operational budgets especially for those least developed countries. From 2007 onwards, international financial support to existing ICM sites were much reduced, and national and local governments provided the major operational costs. Since then, new ICM parallel sites were developed and implemented solely with local or national financing or jointly with other sources, although PEMSEA continued to provide capacity development support. Over 35 sites were set up in the region, all implementing ICM programs that are self-financing.

Many lessons can be distilled from the two decades of ICM practice in the region, especially the approach, forms, and methodology in securing continuous financial and human resources to support local solutions covering a broad spectrum of environmental, social and economic sustainability challenges. This case study focuses on the experience gained from Xiamen and Batangas, which have been operating successfully under different political, social, and economic conditions.

Approach and Methodology

More than 20 years of ICM practice in securing continuous financial and human resources to support local solutions entailed the following approaches:

1. Identifying the preconditions necessary for initial investment by the local governments to initiate, develop, and implement ICM programs and the role of international donors in the process;
2. Delineating required policies and legal instruments which contribute to sustained ICM implementation;
3. Determining the positive impacts of ICM program implementation in generating confidence, commitments, and the drivers towards internalizing and mainstreaming ICM into the local government agenda;
4. Exploring appropriate financing mechanisms or economic instruments used by the concerned local governments in securing the needed financial resources; and
5. Assessing how the ICM sites were able to generate the required financial resources given variations in sociopolitical systems.

These different approaches are presented separately for each site. Despite the disparity, this case study also attempted to present common financing instruments and key supporting drivers which contributed to the successful implementation and sustainability of ICM programs in Xiamen and Batangas.

Results

Pre-conditions for initial investment in ICM program development and implementation

The adoption of integrated coastal management at two coastal sites (Xiamen and Batangas) was largely

influenced and facilitated by international efforts, namely the MPP-EAS project which provided technical know-how and contributed to capacity development of local officials and managers.

In the case of Xiamen, which was one of the five special economic development zones of PR China, there was strong political will and administrative desire to promote and demonstrate mitigation of pollution and conflicting uses of marine and coastal resources in the area. In the case of Batangas, which was identified as one of the major and important marine ports of the Philippines, the focus was on preventing and avoiding pollutive conditions in the coastal area from the expansion of port facilities and the growth of industrial activities. In both cases, the introduction of ICM was a necessity and an opportunity.

Supporting policy and legal instruments contributing to ICM investments

National marine-related environmental protection and conservation policy and sector-related legislations (e.g., pollution prevention and management; shipping; port development; fishery; marine resources exploitation; and habitat protection) supporting policy and legal instruments favored government investment in the ICM program. The ICM approach facilitates integration and pooling of financial and human resources in meeting common objectives and targets, thus enabling the institutionalization of a sustainable and regular government budget.

In Xiamen, the local government implemented several legislations for financing marine environment protection, ecosystem restoration, disaster risk reduction, and endangered species protection (Guo and Engay, this volume).

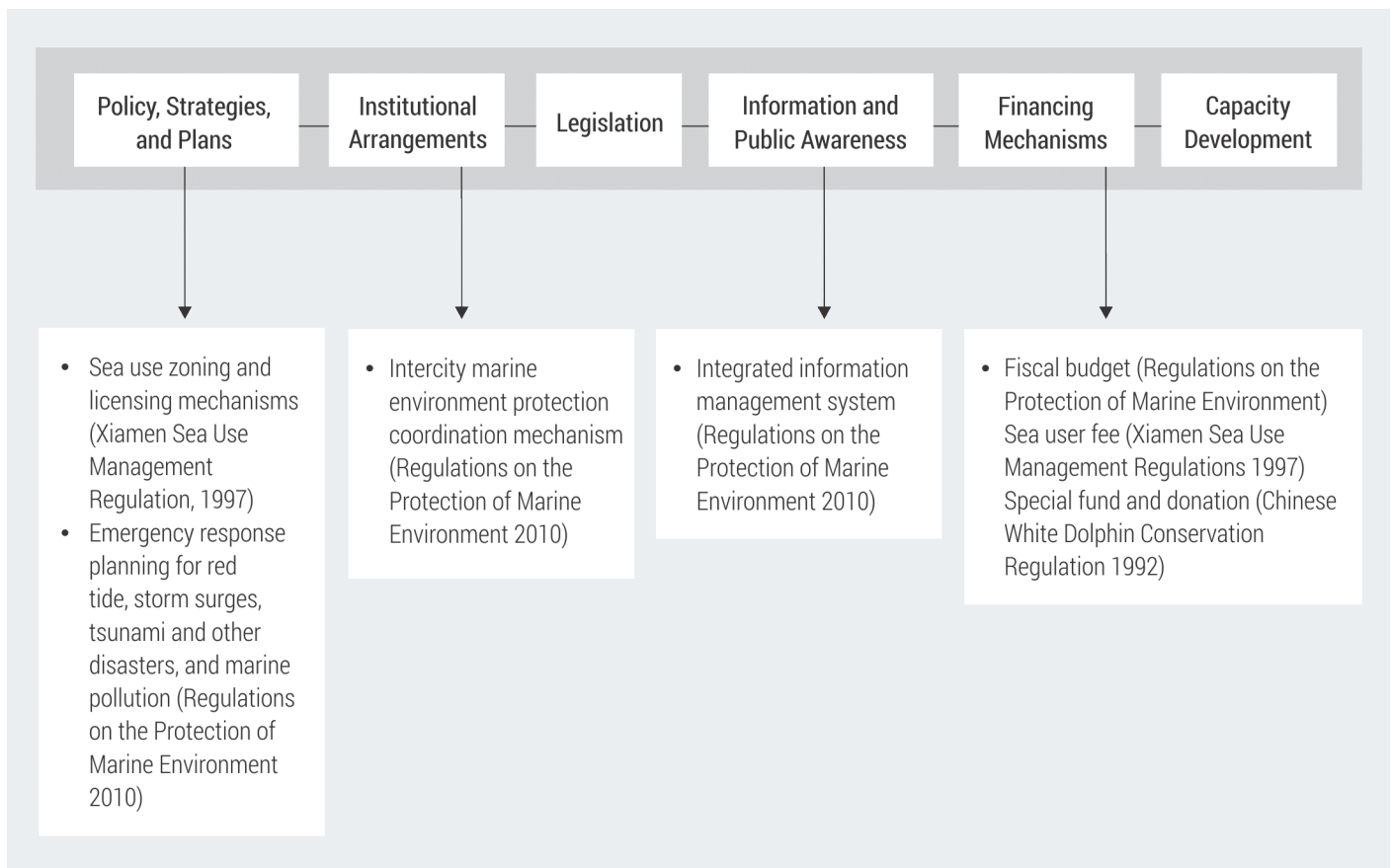
Mandatory allocation of fiscal budget was included in the Xiamen's Regulations in the Protection of

Marine Environment (Article 7), which required municipal and district governments to gradually increase investment in marine ecosystem restoration, marine disaster preparedness and risk reduction, and marine environment pollution treatment. In addition, operational funds were included in the fiscal budget of the different levels of national and local governments (Figure 1). Additionally, special funds were allocated from the local government budget to undertake specific activities which were unique and beneficial to the areas concerned. For example, Article 4 of the Xiamen Chinese White Dolphin Conservation Regulation (1997) stated that the municipal government was required to establish the Chinese White Dolphin Conservation and Development Special Fund to support the species' conservation, MPA management, and scientific research, education, and awareness-raising activities.

In the case of Batangas, supporting policy and legislations were available for ICM program implementation. The Philippines adopted ICM as the “national strategy to ensure the sustainable development of the country’s coastal and marine environment and resources” with the issuance of Executive Order No. 533 (2006). Section 7 of the said strategy provided for the corporate and private sectors, among others, to “be engaged in planning, community organizing, research, technology transfer, information sharing, investment, and training programs in the development and implementation of the ICM program”.

Several key sector-specific legislations were adopted in support of implementing action plans of the ICM programs. For example, in the Philippines, apart from the national policy (E.O. 533, 2006), there was no national or local legislation covering

Figure 1. Statutes that strengthen different aspects of coastal governance in Xiamen ICM legal framework.



the development and implementation of ICM. With respect to water use zoning, Mabini enacted such a regulation through Municipal Ordinance No. 4, 2006. Nine coastal municipalities (Calaca, Calatagan, San Juan, Lobo, Mabini, Tingloy, Balayan, Batangas City, Nasugbu) passed municipal regulations with respect to fisheries. Batangas City and Calatagan passed Municipal Ordinances (in 1996 and 2006, respectively) that limit fishing in their municipal waters to their own resident fishers. Regulations with respect to mining and quarrying were enacted at the provincial level. The Provincial Mining Regulatory Board was established in 1996 and further affirmed through Provincial Ordinance No. 003, 2004, which allocated appropriations for the Board (PG-Batangas and PEMSEA, 2008) (see Figures 2, 3, 4, and 5). These legislations were specific in addressing key sustainability challenges including natural and human-made disasters and climate change, pollution, habitat protection and conservation, fisheries and other marine resources, etc.

Impacts of ICM program implementation in building confidence and commitments for sustainability

Both ICM sites benefitted from the long-term implementation of their ICM programs not only in terms of visible improvements on environmental quality and the restoration of habitats but also in building trust, confidence, commitment, and capability among the stakeholders, which ensured longer term commitment of the local government in adopting the ICM system.

In Xiamen, the local government was able to provide and even generate other financial resources to continue ICM implementation for the past two decades. Understanding the value of the ICM system among local government officials, ICM project staff, and stakeholders generated greater confidence and more investments from the local government.

Figure 2. MPA Management Plans of the municipalities of the Province of Batangas.



Figure 3. Facilitating the implementation of the Strategic Environmental Management Plan (SEMP) of the Province of Batangas: governance.

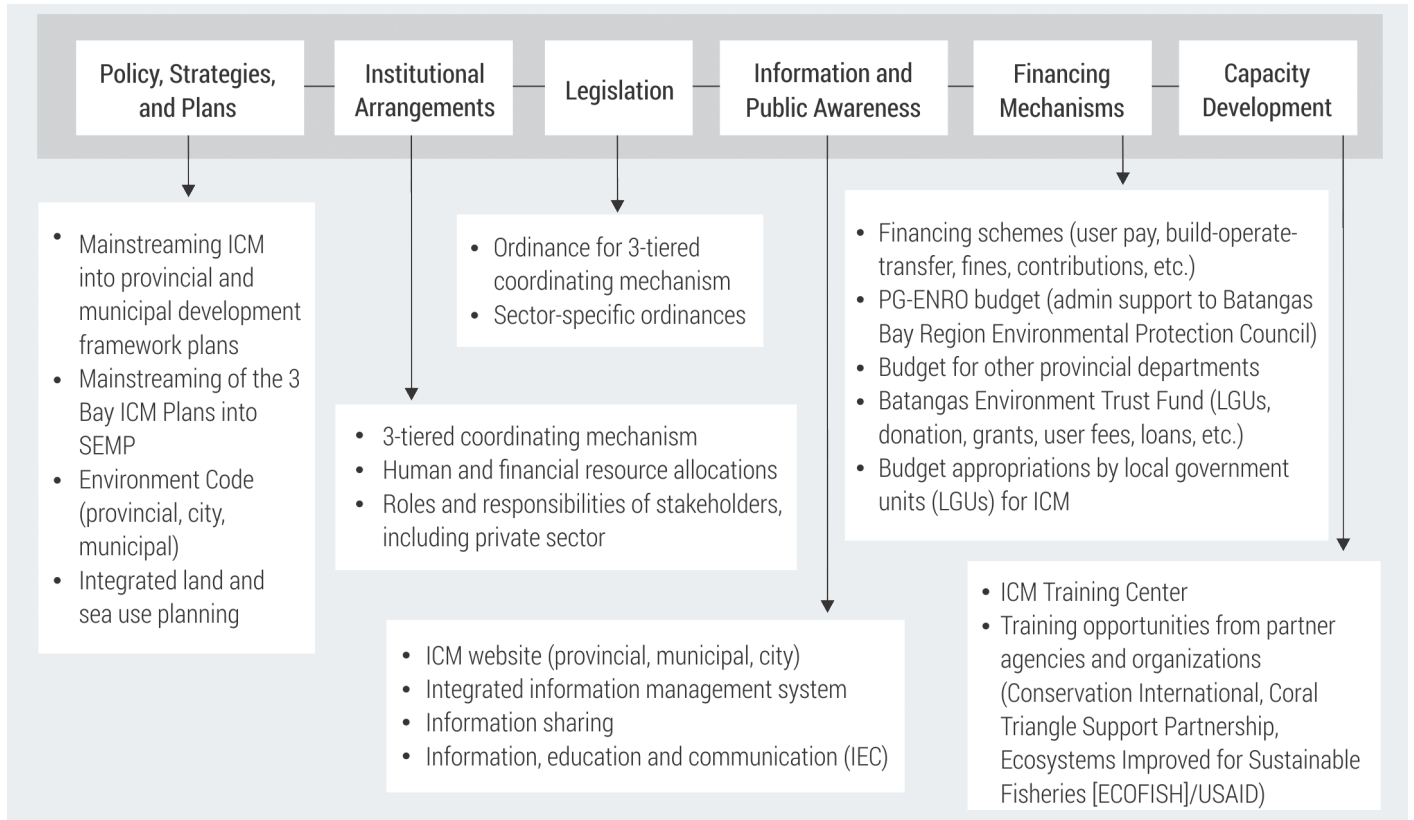


Figure 4. Facilitating the implementation of SEMP of the Province of Batangas: sustainable development aspects.

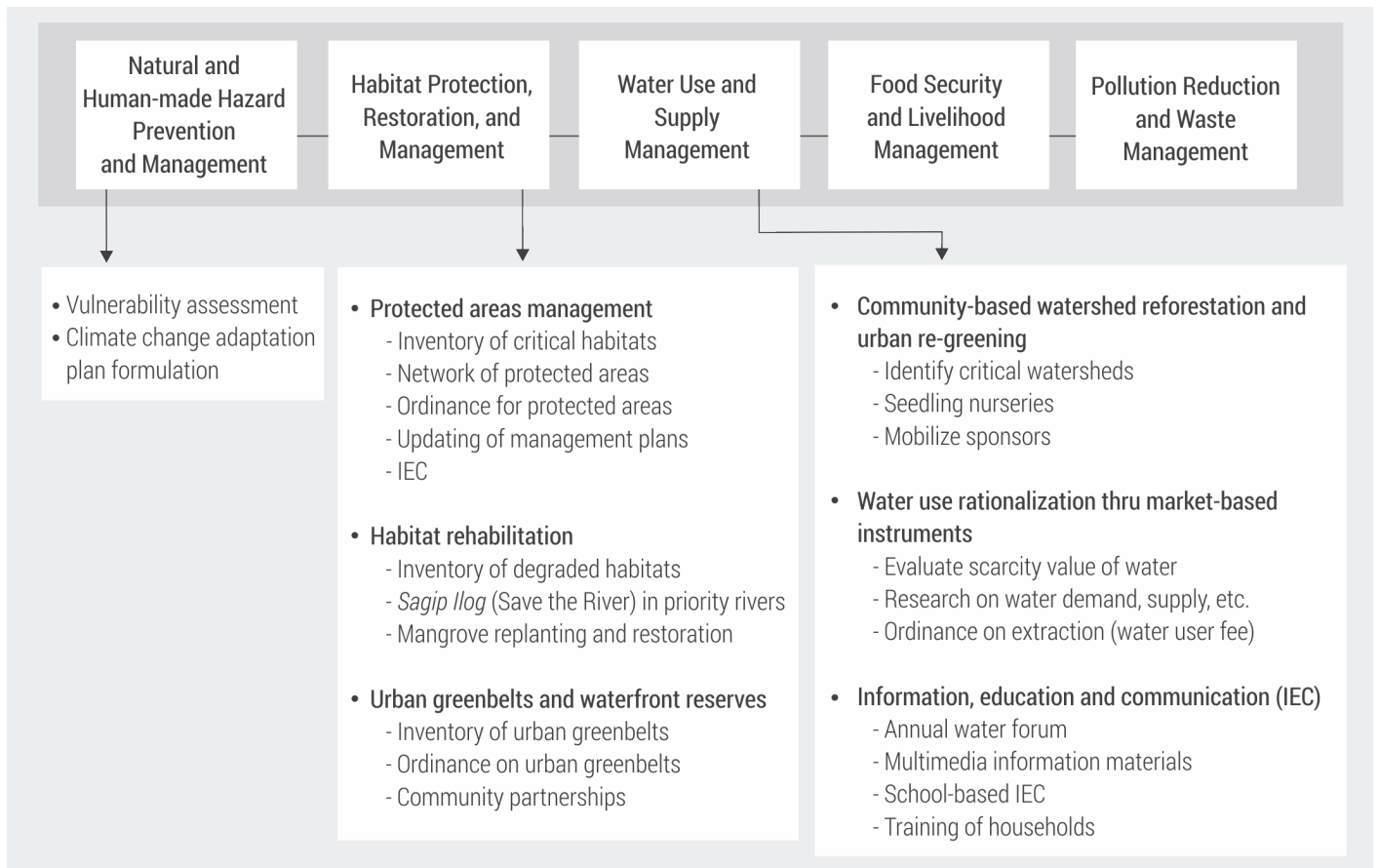
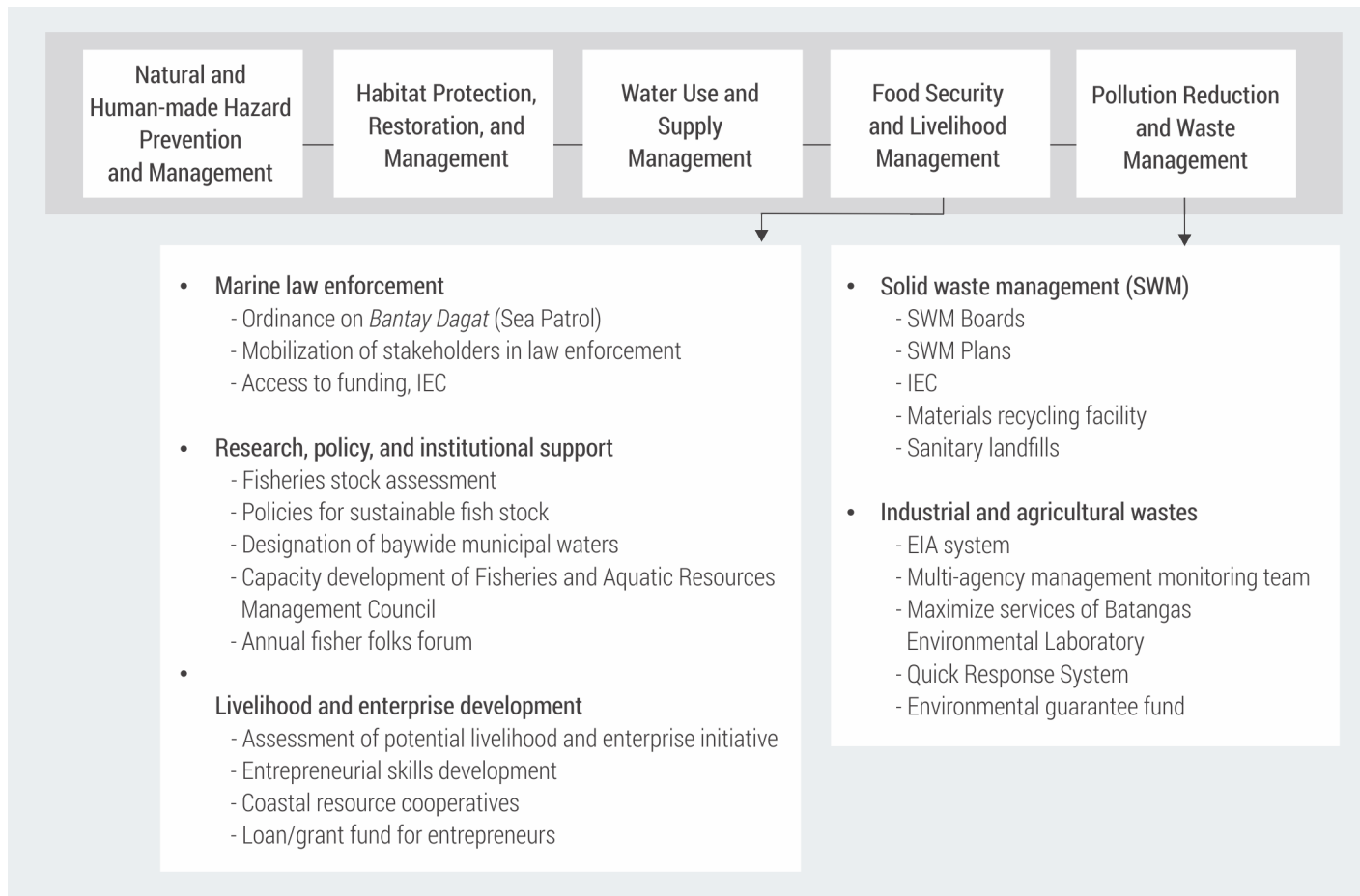


Figure 5. Facilitating the implementation of SEMP of the Province of Batangas: sustainable development aspects.



Similar impacts of ICM implementation were experienced in Batangas. The involvement of the private sector in the ICM program since its initial phase increased the confidence and commitment of the local and provincial governments. The private sector contributed significantly through the Batangas Bay Coastal Management Foundation to projects such as mangrove rehabilitation, oil spill response, and water quality monitoring.

Financial mechanisms and economic instruments for ICM program implementation

a. Fiscal budget allocation. In both sites, annual budget was allocated by the local governments for ICM program implementation. Integrated coastal planning, development, and management were identified as key functions of the government, and the commitment of fiscal budget was seen as a means of ensuring program implementation.

b. User fees. In Xiamen, a permit system was adopted for the use of coastal waters. The Xiamen Sea Use Management Regulations mandated the levy of sea use fee for six types of activities (i.e., engineering, industry, tourism, fishery, dumping, and other activities) (Article 4). The same regulations allowed 70% of the sea use fees to be utilized for sea area development and construction, conservation, and management (Article 19). Thirty percent of the fees was turned over to the national treasury (Uychiaoco, et al., 2009).

The success and experience of Xiamen were recognized at the national level. The enactment of national legislation, the Law of the People’s Republic of China on the Administration of the Seas, was approved by the People’s Congress in 2001. Its general purpose as stated in the law was strengthening the administration of sea area use; safeguarding state ownership of the sea areas and

the legitimate rights and interests of the sea area users; and promoting rational development and sustainable utilization of the seas.

A different user fee system was developed in Batangas (Salao, et al., 2007; PG-Batangas and PEMSEA, 2008; Rawlins, 2009; Maypa, et al., 2012). In the municipalities of Mabini and Tingloy, divers fees were implemented in 2003. Both municipalities enacted the municipal ordinance that imposed a conservation fee on divers, day tourists (picnics), and others to finance their conservation and environmental protection activities. The collection of fees increased from P 225,000 (US\$ 5,600) in 2003 to P 2.5 million (US\$ 53,700) in 2007. Some 85% and 80% of the fees collected in Mabini and Tingloy, respectively, were utilized for management (PG-Batangas and PEMSEA, 2008; Rawlins, 2009). Both municipalities had established environmental funds (Salao, et al., 2007). In Calatagan, 70% of the collection from registration of fishers and boats, as well as fines from fishery violations, were allocated for coastal resource management, while Calaca allocated 70% of the fisheries registration fees for the Fisheries and Aquatic Resources Management Council (FARMC) livelihood projects by 2009.

- c. **CSR.** Prior to the establishment of the ICM initiatives in Batangas, several key corporate entities, which were utilizing the coastline of Batangas Bay for various industrial activities, including oil refining, ship-building, manufacturing, shipping, and ports, were supporting nongovernment initiatives such as the protection and rehabilitation of mangroves, community improvements, etc., as a part of their CSR programs. The ICM initiatives, since 1994, were effectively providing a broader and coordinated framework for pooling of efforts and resources from all sectors in achieving common objectives (Cardinal, 2012).
- d. **PPP.** In Batangas, the Project Coordinating Committee was organized to coordinate the implementation of the ICM program. The

committee evolved into an intergovernmental and multi-sectoral Batangas Bay Region Environmental Protection Council (BBREPC), which created an effective platform for the private sector to participate, channel its expertise, and better define the objectives and expectations of its CSR program. The corporate sector became an active participant in BBREPC, including the planning and development of the ICM program (Chua, 2006; PEMSEA, 2006).

As an active participant, BCRMF was providing supporting funds, staff, and other logistical support for ICM implementation. First Gen, Inc. and Malampaya Foundation likewise were active private sector partners whose activities included artificial reef monitoring, mangrove rehabilitation, waste management, MPA management, biodiversity conservation in Verde Island Passage, disaster preparedness and response, and capacity building for waste management and law enforcement.

The Batangas ICM initiatives catalyzed the development of a new parallel site in Bataan Province during the second phase of PEMSEA. The Bataan Integrated Coastal Management Program (BICMP) showcased the effective partnership among various stakeholders including the private sector in the Province of Bataan (PMO-Bataan, 2006; PEMSEA, 2009). The BICMP actions included annual coastal cleanups, improvements in solid waste management, establishment of sewage treatment facilities, support for livelihood programs, and formulation and enforcement of the Coastal Land and Sea Use Zoning Plan (Erni, 2012, 2013).

Lessons Learned

Although the ICM programs of Xiamen and Batangas were introduced and initiated through external financing, the local governments were able to internalize, adopt, and successfully implement them over a span of two decades through sustained political and financial commitments.

Public sector investment is essential to sustain ICM.

In addition to regular government budgets, both local governments were able to increase public acceptance of paying for the use of the environmental services. They established a fee system for generating revenues for environmental management. In Xiamen, successful implementation of the sea use zoning plans enabled the local government to generate substantial financial resources. The concept of sea use zoning and user fee system was eventually recognized and made into national law thus enabling other coastal municipalities and cities to adopt a similar approach.

Private sector engagement is achievable through CSR and PPP.

The province of Batangas provided on-the-ground examples of how a local government was able to engage with the private sector and how both benefited from this shared responsibility. The corporate sector contributed by providing resources, skills, equipment, and facilities in support of the ICM program. This was a form of PPP, which is broadly defined as collaborations between government and nongovernment actors to achieve mutually defined goals. It demonstrated one way of steering funds from the private sector toward coastal and marine development priorities of local governments. The ICM framework can improve the targeting of private funds for social ends, thereby increasing the development impact of CSR activities compared with independent corporate initiatives in CSR. Engaging these different stakeholders in a partnership can reduce project costs, target benefits more effectively, and improve sustainability as the local community gains greater ownership over project activities. PPP can be a good source of funds; however, on its own, it cannot support the implementation of an entire ICM program.

Hence, sustainability of ICM practices largely depended on: (a) realization of the usefulness, effectiveness, and the process of the ICM system in achieving economic, social, and environmental benefits made possible with strong local government commitments to sustainable development; (b) internalization of the concept and operational modality which leads to mainstreaming of the integrated planning and management approaches into local

government regular programs and budgets; and (c) strong planning and management capability to galvanize and mobilize external or nongovernment funding sources through wise application of financial mechanisms and economic instruments to sustain implementation.

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Building and Maintaining a Critical Mass of ICM Practitioners and Leaders at the Local Level

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Key Message

- Building integrated coastal management (ICM) capacity at the local level creates a critical mass of ICM leaders and practitioners who not only contribute to effective and efficient implementation of ICM programs but also in the scaling up of ICM practice.
- Capacity building and knowledge transfer are not one-off commitments but a continuing process.
- ICM capacity can be built throughout the ICM development and implementation processes; capacity development is an essential component of the governance framework of the ICM system.

Abstract

This case study presents PEMSEA's strategic approach to building the skills of a critical mass of ICM leaders and practitioners in the East Asian Seas region since its start-up in

1993. These approaches include developing and implementing a capacity development program throughout the various phases of ICM cycle and using ICM demonstration sites to replicate and scale up the ICM practice. A capacity building program is proven effective when it is demand driven and designed to address the different skills (and levels of competence) of stakeholders involved in the program. It can directly support and complement the skills required in each stage of the ICM program.

Background

Some of the common reasons attributed to the degradation of the environmental resource base are inappropriate and/or inconsistent application of government policies (e.g., inappropriate economic growth policies, weak regulatory and enforcement systems, urban migration and concentration of growth in a few urban centers; information gaps especially information for decisionmaking; and inadequate environmental management skills) ([Global](#)

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Forum on Oceans, Coasts, and Islands, 2008). Disparities in environmental management capacity within and among countries at the region could significantly weaken effective coastal and ocean governance and hamper the sustainable development of the East Asian Seas (Chua, 2006).

As emphasized in the policy brief on *Strategic Interventions for Developing Capacity to Improve Governance of Oceans, Coasts, and Small Island Developing States Over the Period 2008 to 2018*, “The issues confronting coasts, oceans and small island developing states are becoming more serious. The trends combined with new and emerging issues are placing global, regional and national institutions at risk. Addressing them on a sustainable basis requires building capacity at different levels: in government, in the private sector, in non-governmental organizations (NGOs) and at the community level” (Global Forum on Oceans, Coasts, and Islands, 2008).

ICM is considered a powerful tool for operationalizing sustainable development of coastal and marine areas. It facilitates effective translation of international and national coastal and ocean policies and agreements into concrete actions at the local level. It provides a systematic process for planning, developing, and implementing strategies and programs that respond to emerging issues faced by coastal communities (Chua, 2006).

Various management skills are required for the development and implementation of ICM programs. These include capacities to implement activities that are in compliance with relevant international agreements or national policies, managing conflicts among various resource users, using or managing technical assistance effectively, etc. Equally important are effective leadership skills at all levels of governance, and communication skills to reach out to different stakeholders, in addition to specific technical skills.

Approach and Methodology

Building individual and institutional capacity for integrated coastal management in the East Asian Seas region was achieved using the following approaches:

- 1. Development and implementation of ICM capacity development program throughout the various phases of ICM cycle.** A wide range of skills were acquired and developed as an integral part of planning and implementation of ICM programs as well as managing program activities, including monitoring and evaluation of outputs and outcomes. The required skills range from holistic and integrative planning, harmonization of legislation and policy, solicitation of financial support, to communication and negotiation skills in consensus building, community mobilization, conflict resolution, etc. (Figures 1 and 2). Transferring such skills was largely dependent on a learning-by-doing process. Although taking more time and effort, such an approach was fundamental to ICM skills development and application.
- 2. Promoting the replication and scaling up of ICM practices and their implementation using ICM demonstration sites and national and regional task forces.** Replication and scaling up of ICM programs across the region was facilitated by a core group of individuals and institutions at the national and regional levels (i.e., national and regional task forces). The task forces comprised experienced managers, planners, technicians, scientists, and professionals who had worked at ICM demonstration sites. Utilizing the successful ICM demonstration sites as working models, the national and regional ICM task forces were able to provide technical advice to initiate, facilitate, and support the replication of ICM programs in other coastal areas.

Figure 1. Chonburi CSIP Workshop.**Figure 2. ICM training in Indonesia.**

Results

1. Learning-by-doing through ICM program development and implementation. During the first phase of PEMSEA's Regional Programme (1993-1997), ICM pilot sites were established in Batangas, Philippines and Xiamen, PR China to test the effectiveness of the ICM approach, verify its strengths and weaknesses, identify management challenges, distill lessons, and verify the potential for ICM replication. The development of the ICM program was largely based on the general governance framework and iterative processes prepared by PEMSEA following the key phases of the ICM cycle. The local governments in the two demonstration sites assigned appropriate local staff from concerned line agencies to form the local project teams while PEMSEA provided basic technical support and advice. In short, each demonstration site managed its own project with technical and scientific support from national or provincial institutions. Such approach was critical, not only to create local ownership but also to open up opportunities for developing individual and institutional capacities in the various aspects of ICM development and implementation. Active participation in various project activities and exposure to practical management challenges motivated local staff to acquire the needed knowledge and practical skills to ensure

successful implementation of their respective projects.

One of the essential elements that contributed to the effectiveness of the ICM program in both sites was the ability to involve research and academic institutions to provide scientific support. Local research and academic institutions were considered as primary stakeholders. The establishment of the Xiamen Marine Experts Group to provide scientific support to the Xiamen ICM program was a good example of involving scientists to help in decisionmaking. The multidisciplinary expert group provided scientific and technical support in the development and implementation of the Xiamen Marine Functional Zoning Scheme, the Comprehensive Marine Economic Development Plan, and the Marine Environmental Monitoring Network. This was seen as essential to strengthening the capacity of ICM practitioners to understand and utilize scientific information for policy and management interventions. At the same time, the scientists also learned what information was needed for management decisions.

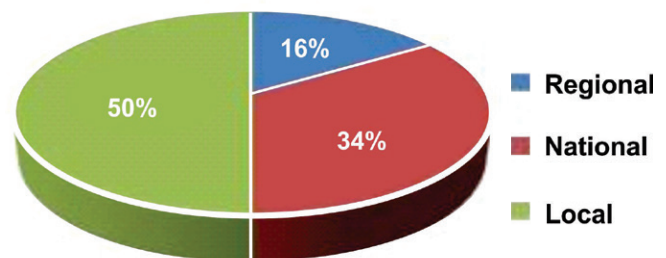
Various scientific tools and methodologies were required in the different stages of the ICM cycle, starting from the identification and prioritization

Table 1. Building capacities through the ICM process.

Stages	Local capacities to strengthen
Stage 1. Preparing	<ul style="list-style-type: none"> • Project development and management for project management staff • ICM training for planning and technical staff and stakeholders • Consultation workshops for the different stakeholders
Stage 2. Initiating	<ul style="list-style-type: none"> • Prioritizing environmental issues (State of the Coasts, Integrated Information Management System, risk assessment) • Formulating management actions (coastal strategy) • Systematically engaging stakeholders (communication plan)
Stage 3. Developing	Training consultations for the formulation of: <ul style="list-style-type: none"> • Policy and institutional arrangements • Coastal strategy implementation plan (CSIP), issue and area-specific action plans • Coastal use zoning • Integrated environmental monitoring • Sustainable financing mechanisms
Stage 4. Adopting	Local government and stakeholders' consultations to facilitate the approval and adoption of: <ul style="list-style-type: none"> • Coastal strategy and action plans • Organizational, legal, and financing arrangements
Stage 5. Implementing	Developing/providing human and financial resources for the implementation of: <ul style="list-style-type: none"> • Coordinating and program management mechanisms • CSIP/action plans
Stage 6. Refining and Consolidating	<ul style="list-style-type: none"> • Monitoring, evaluation and continual improvement • Improving methodologies and approaches; revision of strategies and action plans • Integrating the ICM program into the planning and development cycle of local governments • Re-training of core or new staff

of environmental issues and concerns to the monitoring of environmental changes as a result of the management interventions being introduced. Some of these tools and methodologies were tested and applied in both Batangas and Xiamen ICM sites (PEMSEA, 2010a; Table 1). The cyclical process of ICM not only facilitated a stepwise approach to development of management interventions but also was used as a rational and hands on approach to strengthening the understanding, confidence, and capacity of concerned decisionmakers to more effectively administer effective management measures.

- Using working models for ICM training, replication, and scaling up.** The success of the ICM projects and experiences of Xiamen and Batangas served as working models for ICM in the region. Both sites became training laboratories and venues for regional

Figure 1. PEMSEA training activities by level (2008–2013).

ICM training and study tours organized and conducted by PEMSEA. From 2008 to 2013, over 77 training, workshops, and orientation activities were organized and conducted involving 2,426 participants from 12 countries in the region. Of the activities conducted, 50% of these were conducted at the local or site level, 34% at the national level, and 16% at the regional level (PEMSEA, 2010b, 2013; Figure 1).

Based on the more than 20 years ICM experience, the ICM framework and process were proven to be a valuable contribution to the development of technical, professional, and management skills encouraging and facilitating multi-stakeholder involvement at the local level. Training programs were designed and implemented in accordance with activities and skills required at various stages of the ICM program development and implementation cycle.

At the preparation stage of the ICM cycle, program managers and technical staff were trained in basic project development and management and the ICM concepts and principles. Relevant stakeholders were also trained together with program personnel thereby providing a forum for exchange of views and opinions while learning from each other. In cases where expertise at the local and national level was lacking, consultants from developed countries were tapped. In this case, local people worked with these consultants in the various activities and learned by doing.

Conducting training in parallel with program activities and timeframes at ICM sites was strategic; it enabled trainees to apply newly acquired skills and understanding immediately in their daily work. As a result, trainees were able to gain confidence in the application of new skills and the local governments were able to benefit from expanded capacities of existing staff to not only implement an ICM project, but also strengthen local capacity in governance of coastal and marine areas and resources.

A good example was the ICM program in the province of Sihanoukville, Cambodia, which started in 2001. Due to the lack of managerial and technical personnel with ICM knowledge and experience, the program was initiated with the assistance of a regional task force that helped in the conduct of environmental profiling and public awareness activities. As the

Before I worked with PEMSEA, I felt that I did not understand what environment and coastal management meant. But in 2001, after being trained in ICM, my knowledge on the environment and coastal management improved. Since then, I worked as project administration staff for the PMO for the ICM implementation in Sihanoukville, Cambodia. Using the learning-by-doing approach and under the full technical support of PEMSEA Regional Task Force, I became a technical staff and coordinated ICM activities with the concerned agencies.

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ICM program progressed, various task teams were established and trained to undertake the different ICM activities with the help of the regional task force. These provided them an opportunity to learn from each other and to develop their capacities on the different ICM tools and methodologies. As a result, a critical mass of trained people was developed who were able to transfer the knowledge and skills acquired to other coastal provinces across the country. The experiences in Sihanoukville were utilized as a training ground and knowledge-sharing center to other coastal provinces and municipalities identified as scaling up sites under the national ICM program of Cambodia.

3. **Effective use of ICM demonstration sites to facilitate learning-by-seeing.** One of PEMSEA's effective approaches to changing perception of policymakers, local government officials, and political leaders from a "sectoral" to an "integrated" approach to coastal management was the study tour program. The program enabled participants to gain exposure to practical issues affecting sustainable development of coastal areas and how governance mechanisms were established and strengthened through the ICM process. Various aspects of ICM implementation were

demonstrated in the study tour at ICM sites. Each ICM site was selected to provide a unique perspective of strengthening the governance mechanism for ICM implementation and good practices in developing and implementing issue specific management programs that a new ICM site could learn (Table 2). For example, the ICM program of Bataan Province, Philippines, was identified to demonstrate how the private sector was engaged and integrated into the ICM process.

On the other hand, Batangas Province was used to highlight how ICM was replicated in all coastal municipalities of the province. The scaling up process, including the mainstreaming of ICM into the planning process of local governments,

was also a unique feature of the Batangas ICM program. Thus, exposure to successful ICM sites was believed to be an effective strategy that could change the mindset of political leaders and local government officials toward an integrated approach to coastal and marine resource management.

- 4. Mobilizing regional and national task forces for knowledge and skills transfer.** In 2009, PEMSEA Country Partners made the commitment to scale up ICM coverage to 15% of the region's coastline by 2015 (Manila Declaration, 2009). In response to this challenge, regional and national task forces with various skills, tools, and technologies were established. The purpose of the task forces was to

Table 2. Good practices in ICM sites.

ICM site	Good practices
Bali, Indonesia	<ul style="list-style-type: none"> • Integrated beach conservation • Integrated approach to waste management
Batangas, Philippines	<ul style="list-style-type: none"> • Institutionalizing the strategic environmental management plan • Private sector involvement in ICM • Application of financing mechanisms to sustain ICM program • Local government environmental monitoring initiative • Replication of ICM program to all coastal municipalities
Bataan, Philippines	<ul style="list-style-type: none"> • Private sector investment in an ICM program • Development and implementation of land and sea use plans
Cavite, Philippines	<ul style="list-style-type: none"> • River rehabilitation and flood control project • Coral reef protection and marine reserve establishment
Chonburi, Thailand	<ul style="list-style-type: none"> • Community-based crab conservation initiative • Integrating Oil Spill Preparedness and Response into the Provincial Disaster Prevention and Management Program • Engaging scientific partners for marine conservation and management
Da Nang, Viet Nam	<ul style="list-style-type: none"> • Creating livelihoods and promoting sustainable fishery management • Engaging civil society groups in the ICM program • Disaster risk reduction planning and management
Guimaras, Philippines	<ul style="list-style-type: none"> • Implementation of ICM in an island ecosystem
Selangor, Malaysia	<ul style="list-style-type: none"> • Development and implementation of integrated coastal use zoning • ICM scaling up throughout the coastline of Selangor
Sihanoukville, Cambodia	<ul style="list-style-type: none"> • Coastal tourism and beach management • Community-based fishery and water resources management for livelihood improvement
Sukabumi, Indonesia	<ul style="list-style-type: none"> • Climate change adaptation and disaster risk reduction
Xiamen, PR China	<ul style="list-style-type: none"> • Socioeconomic benefits of ICM • Addressing multiple resource use conflict through marine functional zoning • The role of an interdisciplinary experts group in ICM

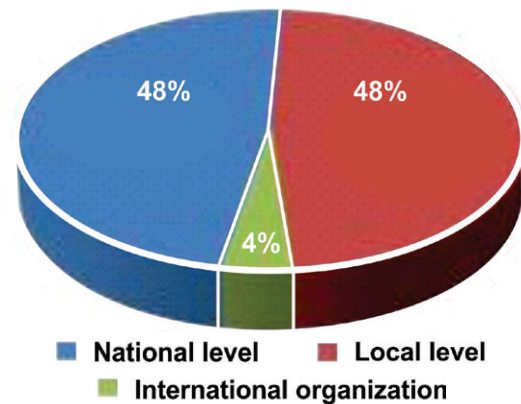
provide technical support to national and local governments, NGOs, and community members to develop and implement ICM programs, as well as to facilitate access to scientific and technical expertise. Mobilization of the task forces was instrumental in promoting wider dissemination and transfer of knowledge, experience, and skills in ICM practice, tools and methodologies, thereby facilitating scaling up of ICM programs in countries across the region.

The task forces were mostly made up of members of the ICM core team of universities (i.e., ICM Learning Centers) in Cambodia, PR China, Indonesia, Philippines, and Viet Nam.

5. **Hands-on training for young professionals.** From 1995 to 2010, the PEMSEA's ICM Internship and Fellowship Programme was able to host 39 interns mostly ICM project personnel from local governments tasked to develop and oversee and/or implement ICM programs in their area (PEMSEA, 2013; Figure 2).

The interns were required to choose specific subject areas, in most cases focusing on the various ICM tools and methodologies. The program enabled interns to enhance technical

Figure 2. Intern's affiliations 1995–2010 (at the time of internship).



support to ICM sites with the guidance of PEMSEA Resource Facility (PRF). Immediate needs and issues were responded to through the interns' access to technical staff at the PRF. ICM program needs, such as project proposals, identifying workable program strategies, State of the Coasts (SOC) reports, case studies, to name a few, were completed by the interns for their sites during the program. Examples of interns' outputs are shown in Table 3.

The internship and fellowship program was an important contribution to accelerating the implementation of ICM program at various sites and promoting transfer of knowledge and skills through hands-on training. Many of PEMSEA's

Table 3. Interns' outputs.

Country	Output
Cambodia	Draft State of the Coasts Report of Sihanoukville
China	Refined Xiamen State of the Coasts report Refined Jiulong Integrated River Basin and Coastal Area Management Plan and Operational Strategy Refined Case Study on Risk Mitigation through Effective Implementation of Integrated Management in Xiamen Draft Operating Guidelines for PNLG Secretariat Operations Case study development and review of coastal use zoning training modules
DPR Korea	Refined Taedong River Management Strategy
Indonesia	Draft Action Plan for ICM Scaling-up: Jakarta Bay and Ciliwung River, work program on pollution reduction
Lao PDR	Xedone Integrated River Basin Sustainable Development Strategy State of the Coasts Draft Report for Sedone River
Timor-Leste	Inputs to the State of the Coasts Report Action plans for the development of livelihood programs in two districts and at the national level
Viet Nam	Refined workplan and budget of ICM programs Draft outlines for the State of the Coasts Report Action plans for project proposal development for Small Grants Programme

past interns were able to eventually occupy key positions within their central and local governments and were able to contribute to the development of ICM or ICM-related policies in their respective countries.

Lessons Learned

Over more than 20 years of ICM experience in the East Asian region have resulted in numerous good practices and lessons learned in building ICM capacities to support ICM program implementation, replication, and scaling up. Some of these include:

- Hands-on approach is an effective means for building ICM capacities at various levels;
- Engaging the different stakeholders in various ICM activities promotes ownership and buy-in and facilitates learning and sharing of knowledge and expertise;
- Learning-by-doing approach empowers local personnel;
- Involving scientists and research institutions not only contributes to innovative scientific and technological support system to strengthen quality of ICM programs but also promotes mutual learning between managers and scientists;
- Training and other capacity development programs should be designed based on the technical and management requirements of the ICM program and available resources; and
- ICM capacity development at the local level significantly contributes to sustainable development of coastal and marine resources at national and regional levels in support of global sustainable development objectives.

More importantly, the above analysis strongly supports the inclusion of capacity building as an essential component of coastal and ocean governance at par with other components such as policy, legislation,

strategies, communication and financing. Capacity development is an indispensable part of the ICM system and must be given priority consideration right at the beginning of ICM program initiation.

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The Application of the ICM Cycle for the Development and Implementation of ICM Program: Usefulness of the Process, Challenges, Constraints, and Lessons Learned

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Key Message

- Knowledge of the integrated coastal management (ICM) cycle is critical to the proper and correct implementation. With recent trends to scale up and replicate ICM practices in the East Asian Seas region, the cycle guides, structures, and models ICM implementation at the local government level. The main challenge is how to sustain the process and how it can be systematically (and strategically) done.

Abstract

The ICM practice has evolved and matured worldwide in the past 50 years. That maturity was driven by the correct application of the ICM cycle. At the onset, it brought about the realization that an integrated coastal governance policy must not exist separately from its

implementation. The ICM cycle is essential as it provides a stepwise, non-negotiable “must haves” to be able to go to several next steps. It must be properly conducted to contribute to continual improvement. The goal is to have a functional ICM system to enhance local governments’ services and contribute to sustainable development.

Background

Over the last 50 years, coastal management concept and practice have evolved and matured into an ICM System. In the East Asian Seas (EAS) region, ICM started gaining adherents in the early 1980s (Bonga and Chua, [this volume](#)). However, the initial models and concepts followed by the region — as well as other developing regions in the world, e.g., Latin America and East Africa — were inadequate and not clearly understood, to say the least.

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Two problems were evident to ICM practitioners in its early run.

One, there was a lack of implementation during a project's timeline (Chua, 1998). In the ASEAN/US Coastal Resources Management Project, one of the earlier ICM projects in eight pilot sites in Southeast Asia (Scura, et al., 1992), program implementation was not undertaken at all. This was because the project design did not have provisions for implementation during the project's lifespan. All the time and effort were used in undertaking resource surveys and assessments and scientific studies and in putting up management plans. To a significant extent, the problem lay in the understanding (or misunderstanding) that implementation is outside the project authority's responsibility, and lies with the local or national governments. It was also initially assumed that a local/national government would readily give a go-ahead to suggested management plans, mostly crafted by international donors and external experts and consultants. But most of these plans were without clear indications where and when the human resource and money for the implementation would come from and thus, were not implemented.

Further, even if the projects were implemented, almost all initiatives did not go through multiple cycles (Olsen, 2002; Chua, 2008a). As it was envisioned, ICM needs to be a long-term, iterative engagement. Most programs were abandoned after the withdrawal of external financial and technical assistance (Pomeroy and Carlos, 1997; Olsen, 2002; White and Salamanca, 2002; Christie, 2005; Chua, 2008a); when institutional disagreement

ensued (Archer, 1988; Imperial, et al., 2000); when loopholes in legislation became apparent (e.g., a lack of coherence between sectoral policies (Sharma, 1996)); or when there were inefficiencies in operationalizing existing legislation (Taljaard, et al., 2013).

The failure to implement some of the proposed action plans stifled initiatives, confidence, and commitment among concerned local government departments, decisionmakers, and stakeholders (Chua, 1998, 2006, 2008a).

In the succeeding ICM programs in East Asia, particularly those spearheaded by PEMSEA in the early 1990s¹, a model utilized an ICM program cycle that proffered direct engagement of local government executives (together with other stakeholders). In the PEMSEA model, the whole program was developed to consciously integrate the policymaking, planning, and management processes of integrated coastal governance — in a series of phased, structured, and formalized stages — with the local government's development, planning, and implementation processes (and its timeline and capacities). This tweak came at the realization that an integrated coastal governance policy must not exist separately from its implementation.

Approach and Methodology

The ICM cycle was developed as a six-stage, stepwise, iterative, and incremental process that offered long-term, continual improvement

¹ As enumerated by Taljaard, et al. (2011), other ICM frameworks and implementation models have also been tried in the region and worldwide, including: cross-sectoral integrated coastal area planning (CICAP) process (Pernetta and Elder, 1993); Olsen's ICM cycle (Olsen, et al., 1997, 1999); the model proposed by the Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP, 1996); the World Bank guidelines (Post and Lundin, 1996); the ICM guidelines by Cicin-Sain and Knecht (1998); the European integrated coastal zone management recommendations (European Commission, 2002); the Canadian integrated management model (DFO, 2002); the Australian implementation model (NRMMC, 2006); and the flexible cyclical umbrella model proposed by the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) (UNEP/GPA, 2006).

Figure 1. The ICM development and implementation cycle. (Source: Chua, 2008a)



(Figure 1; see Box 1 for the ICM cycle narrative of the processes). The PEMSEA redesign helped local governments and managers get out of the perpetual planning conundrum experienced by ICM and other past natural resources management approaches.

The timing of introducing an ICM cycle redesign in the early 1990s — and again in the mid-2000s — was propitious.

First, its target was toward directly engaging and empowering local chief executives and local agencies. The redesigned ICM cycle was nearly identical to, and reflects the public administration’s adaptive policy cycle, commonly referred to now as the PDCA cycle: plan-do-check-act. The redesign did not seek to re-invent, but instead harmonized with what local governments were familiar with

or proficient in. This commonality was the first step into looking at where the entry points were, to be able to integrate an ICM program to a local government’s mandated processes.

It was much easier to convince local governments to adopt an initiative or new model when the processes involved were known, unambiguous, or were previously used by them. In this case, an existing system (PDCA cycle) — which was usually committed to individual, institutional, and societal memory and transactions — was readily utilized as basis for another undertaking (a redesigned ICM cycle). This policy and functional integration was one of the simpler ways of showing that ICM is integrative.

The buy-in and ownership of a new undertaking started when local governments recognized that

Box 1. The ICM cycle (Chua, 2008a; Ross, 2012).

The **Preparing** stage focuses efforts on setting up the management and administrative aspects of the ICM site, which includes: (1) establishment of a project management office (PMO) to coordinate the implementation of identified activities and selection of project staff; (2) establishment of an interagency, multisector coordinating body (normally in the form of a project coordinating committee or PCC) that will coordinate diversified project activities and direct the program; (3) establishment of a technical working/ advisory group to provide technical and scientific advice to the project; and (4) clarification of working relationships within the local government and among national government agencies and other stakeholders.

It is also essential to prepare a workplan and arrange available financial and other administrative resources. To effectively implement the workplan, the project staff are trained at this stage and stakeholders are provided with information on the rationale and benefits of ICM. Proper communication with stakeholders minimizes their resistance to the project and increases their participation and support in implementing activities.

At this early stage, a project monitoring and evaluation (M&E) system is set up to measure the progress and achievements of the project. The M&E system, designed for long-term application, should be practical and easy to apply, and provide useful information to local governments and stakeholders for mapping and tracking the ICM work plan and budget. At this point, an initial status review can also be conducted using the ICM Code as a standard for assessing existing governance and management conditions at the local level. The outcome can be useful in providing direction and support to local governments to further strengthen their management and administrative capacity and efficiency through an integrated management approach.

The **Initiating** and **Developing** stages are time-consuming as they literally cover the development of comprehensive strategies and implementation plans following the requirements of the ICM Code.

In the **Initiating** stage, environmental issues and concerns are identified and prioritized for management interventions. Preparation of a baseline State of the Coasts (SOC) report consolidates the socioeconomic, cultural, political, religious, and ecological characteristics of the site. Such information will determine the types and level of policy and management interventions needed. An integrated information management system (IIMS) can be set up at

this stage, in order to store relevant data and information and to facilitate easy retrieval, information-sharing, and use among participating agencies/institutions.

By conducting an environmental risk assessment (ERA) using the collected secondary information, a priority ranking of environmental concerns can be developed.

The SOC, IIMS, and ERA entail extensive stakeholder consultations, which contribute to improved understanding and appreciation of the linkages between human activities and the coastal and marine ecosystem. This awareness translates into increased interest and participation in the preparation of a coastal strategy. The coastal strategy involves consultations among stakeholders from sectors with different perspectives. The objective of the coastal strategy is to formulate and agree upon a common vision and long-term framework of actions in developing and managing their shared coastal area.

To address the perceived environmental risks, the **Developing** stage prioritizes the action programs within the coastal strategy for short, medium, and long-term implementation. A coastal strategy implementation plan is developed as a collaborative planning exercise involving the lead agency and line agencies. It identifies goals, targets, measurable indicators of progress and outcomes for key management interventions, based on the coastal strategy. The implementation plan also specifies an indicative budget and financing strategy for each action program. It enhances the coordination and integration of many diverse projects to ensure effective use of time, funding, and resources.

Although financing is a critical need for the development and implementation of an ICM program, it is not a limiting factor. An ICM program can be initiated within the limits of existing financial resources using available line agency budgets. The key is the strong support and participation of the relevant agencies because benefits are accrued from such participation. In particular, line agencies with a mandate in disaster, water, habitat, pollution, and fisheries management are able to benefit from the ICM approach. It provides an opportunity to pool interagency resources – an important step towards securing needed financing – for achieving common objectives and implementing agreed plans of action.

When executing the implementation plan, a multistakeholder and integrated environmental monitoring program is operationalized in order to monitor changes in

Box 1. The ICM cycle (Chua, 2008a; Ross, 2012) cont.

environmental conditions and assess the effectiveness of management actions. The monitoring program is designed to provide information to SOC (to determine changes and trends in governance, and socioeconomic and environmental conditions), as well as to ERA (to determine levels of risk as a consequence of environmental changes and trends).

Other key outputs from the Developing stage include: (1) institutional arrangements and supporting sustainable financing mechanisms that are established to ensure the program's sustainability within existing social, political and legal structures; and (2) a coastal use zoning scheme and its implementing arrangements that are set up to provide local governments with a mechanism for planning and managing development and human activities in coastal areas, as well as for establishing permits, user fees, etc., for access to/use of coastal and marine resources and services.

Adoption of the above plans and arrangements by the local government guarantees the integration of the plans into the development planning framework of the local government, allocation of budget, harmonization of efforts, and institutionalization of coordinating arrangements for implementation of the action plans. Involvement of the lawmakers and public to pass local laws in support of the proposed plans in the **Adopting** stage requires intensive public awareness and political will. Thus, a target-oriented communication plan needs to be developed and started during the Initiating and Developing stages in order to prepare the concerned policymakers and stakeholders for the Adopting stage.

The **Implementing** stage demands the availability of competent personnel, financial resources, as well as the political commitment to implement action plans. Thus, this stage emphasizes setting in place institutional/legal arrangements and financial mechanisms to operate the ICM program, which were committed under the coastal strategy implementation plan. The project management arrangements at this stage can be transformed, becoming integrated into the local government's institutional structure through appropriate legislative procedures.

Training and development of competent personnel in the different line agencies and sectors involved in ICM implementation is also a key aspect at this stage. A critical mass of human resources must be available at the local level or available within reach of the local

government. A successful ICM program is built on the local capacity to plan and manage the coastal and marine areas. One good practice is to link an ICM program with a local university or research institution whose staff can be further developed and knowledge and skills improved so that they will be capable and effective in providing the needed technical support to the concerned local government.

The cyclical nature of ICM allows improvements in methodology, approaches and actions as ICM practitioners gain experience and acquire technical expertise. It allows a gradual shift from conventional or adaptive management to more science-based management.

During the **Refining** and **Consolidating** stage, a practical and efficient M&E system, established at the onset (Preparing) facilitates the process of assessing ICM program implementation and management. Updating the SOC report provides the local government and stakeholders with an assessment of ICM achievements and resulting changes, and contributes to the planning for the next ICM cycle.

The timeframe required for developing and implementing an ICM program may vary, depending on the geographical scope, severity of environmental issues, complexity of the management issues, and institutional and financial capacity of the local government. In most instances, it may take several decades to attain the common vision and desired outcomes of the coastal strategy. Five years, however, is sufficient to develop and implement the first ICM cycle. With experience, the project timeframe should be reduced to 3-5 years, preferably coinciding with the planning cycle of the local government.

The next program cycle begins when new action plans are being formulated and implemented, based on the experience and foundation established in the previous cycle. The new cycle can address the challenge of scaling up the ICM program with regard to the following contexts: (1) geographic expansion of existing ICM program and/or replication in other coastal areas; (2) functional expansion of ICM with regard to management issues, including the linking of coastal management and watershed and river basin management; and (3) temporal considerations, as ICM needs to become an integral part of government programs instead of being implemented as a separate project.

they can produce results given clear and well-articulated goals, objectives, and processes. This realization stemmed from public administration's lens of abiding by its mantra to an objectives and results (and, thus to impacts-) based approach.

Second, in 1994, GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection and Advisory Committee on Protection of the Sea) defined the practice of ICM and exhorted how science must be incorporated in the ICM processes. In 1996, GESAMP advocated a five-step ICM cycle (GESAMP, 1996), a precursor to some of the succeeding ICM cycles that were developed, including the cycle adopted by PEMSEA. The five-step cycle of GESAMP demonstrated specific contributions of science in each stage, and thereby extolled the importance of enhanced interaction among scientists, managers, and decisionmakers working together as a team (Chua, 1997; Bremer, 2011; Taljaard, et al., 2011).

Chua (1997) analyzed the essential elements of science in coastal management and exhorted that policy and management interventions should be based on sound scientific findings. He further emphasized that in order to maximize the inputs of natural and social sciences, problem-oriented research must be encouraged to provide the needed information required for management actions. The need for a stronger science-policy integration was enshrined through this understanding.

It is a fact that uncertainty abounds and it is improbable that complete knowledge about very dynamic ecosystems, their resources, processes, and interactions can be known. Despite these limitations, managers, local executives, and other stakeholders are duty-bound to make decisions. They are still mandated to plan, implement, re-assess, and learn from their actions (or inactions) about managing resource use, allocations, and development. This in itself is an expression of

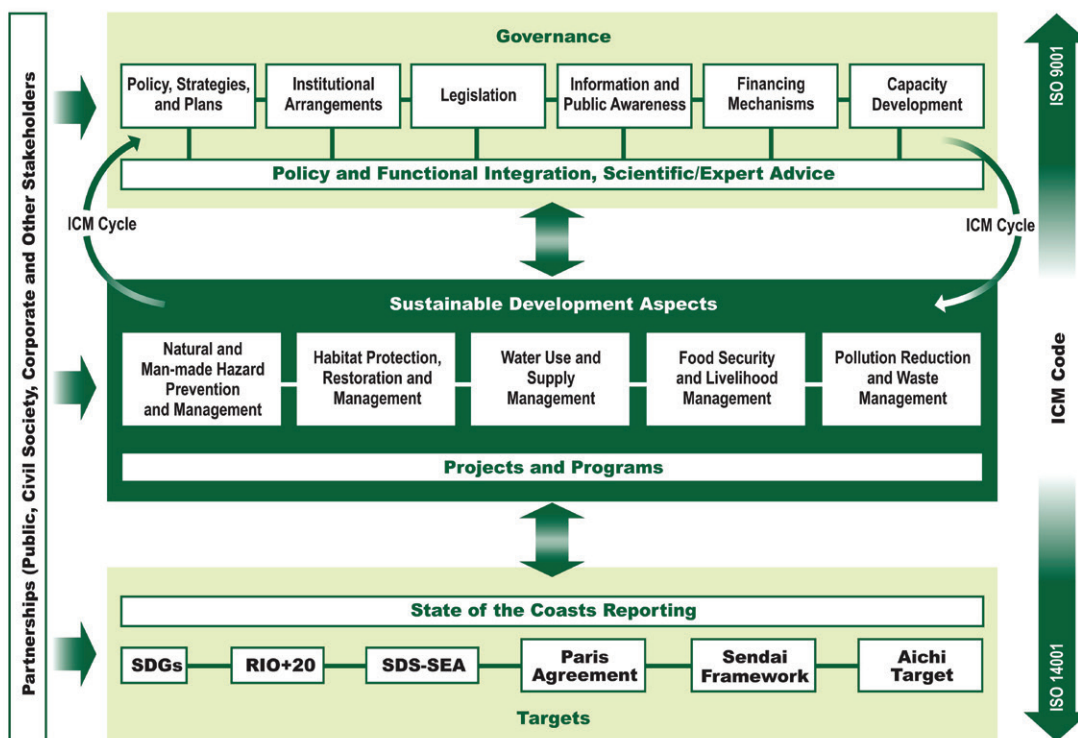
adaptive management operationalized through the ICM cycle: “a structured decision-making” (Allen and Gunderson, 2011); “simultaneously managing and learning” (Williams, 2011); and “a cyclical process [that emphasizes] the importance of continuous adaptation based on new learning, thus allowing for a systematic refinement of the overall implementation process” (Taljaard, et al., 2013).

Combining best available science, local knowledge and local institutional structures and capacities, the ICM cycle guides and steers actions; and therein lies the more potent contribution of ICM to the adaptive management approach, often referred to as “science-based approach to managing natural resources” (Williams, 2011). A science-based “learning by doing” approach was advocated through this: a continuous learning about how ecosystems respond while managing the interventions that have been planned and agreed upon. Appropriate scientific monitoring protocols underpinned by an indicator-based evaluation became necessary tools.

Last, by the mid-2000s, an updated ICM cycle was developed and PEMSEA began advocating and using a comprehensive, multifaceted, ecosystem-based framework: the Framework for Sustainable Development of Coastal Areas (SDCA) (Figure 2). This was in alignment with developments in the international arena, in particular, the endorsements made through the World Summit on Sustainable Development in 2002: bigger investments in establishing stronger partnerships (among governments, civil society groups, and private sector) and using an ecosystem-based management approach to augment the integrated coastal and ocean governance frameworks. Around this time, the paradigm shifted towards integrative and collaborative coastal and ocean governance approaches.

The SDCA Framework provided as comprehensive a platform as possible by which to achieve

Figure 2. Process-oriented common framework for sustainable development of coastal areas through ICM implementation. (Source: PEMSEA, 2007)



sustainable development goals in coastal areas, utilizing the ICM cycle as its principal driver². The SDCA Framework, although based on initiatives in the East Asian Seas region, was generic enough to be used by other regions: it represented the results of the conceptual and operational “loop” of the ICM cycle practiced over the decades. This conferred the dynamism through which the SDCA Framework operated; as such, in the spirit of adaptive management, the SDCA Framework steered actions as new challenges (and opportunities) in environmental emergencies (and economic investments) arise. In other words, the

call for action became: managing the constancy of change in our ecosystems, including the significant contributions of humans and societies.

The SDCA Framework ensured more focus and accountability in coastal governance; and in a pragmatic sense, aligned to what experts always call out: to “drive management toward clearly important or tractable issues so that solutions can be demonstrated” (Taljaard, et al., 2011). In this updated ICM cycle, the importance of complying with a standard, certification-based ICM Code was raised.

² For more discussion about the SDCA Framework, see Bonga and Chua (this volume) and Bermas and Chua (this volume).

Results

A continuous (and sustainable) ICM operation within local government's administrative functions has been demonstrated

PEMSEA's first two ICM demonstration sites in Batangas (Philippines) and Xiamen (PR China) modeled the ICM planning exercises that were built within the existing local development planning process, taking into consideration the timing and schedules, actors, and funding. Other PEMSEA ICM sites were informed by this model and continuously received mentoring from both sites, now considered as "laboratories" of successful ICM.

Viewed (and operationalized) not as an independent process, the ICM cycle contributed in: (1) mainstreaming the ICM processes and action programs into public policy deliberations and resource appropriations; and (2) in the spirit of interagency integration, of bringing different agencies into the ICM process.

To date, the Batangas and Xiamen ICM sites have tucked in more than 20 years of continuous ICM operation under their belts, going through at least four ICM cycles. Their ICM programs were launched in early 1994. As reviewed by [Chua \(2006, 2008b\)](#), [Zhou and Lu \(2006\)](#), and [Ye, et al. \(2014, 2015\)](#), both sites have logged in the following experiences:

- Each project was able to complete the first cycle in about six years. Essential information on the elements of coastal governance (policy, strategic action programs, legislation, institutional arrangement, financing, stakeholder consultation, information management, and capacity development) was acquired and the ICM program was formulated. During the first cycle, the Global Environment Facility's (GEF) contribution to total project funds was about half to two-thirds of the total amount allocated. The remaining amount came from the local

governments and counterpart contributions from the private sector, as in the case of Batangas.

- From 2000 to 2007, a second cycle was started to implement activities identified in their action plans. In this stage, the local government covered almost 90% of the total costs, while the GEF's contribution was used mainly to support incremental cost, such as preparation of case studies and the development of ICM training centers. In Xiamen, a proper allocation for the long-term restoration of Yuandang Lagoon was guaranteed after the allocation of ICM funds was internalized in the annual government expenditure. With the decline in external funding, this period commenced with establishing sustainable financing for further investments.
- A third ICM cycle began around 2006-2008 (until 2013) and focused on geographical and functional scaling up of ICM practice. In Xiamen, other ICM projects such as the Xiamen Western Sea treatment, comprehensive environmental management of Xinglin Bay, restoration of Wuyuan Bay, protection and recovery of biological resources and rare species, and Jiulong River watershed integrated treatment were carried out. In Batangas Bay, building from its experiences, scaling up was expanded to the adjacent Balayan Bay and Tayabas Bay.
- In 2014, both sites logged in their fourth cycle of ICM implementation.

A deliberative first cycle and intuitive next cycles

Over the years, the influence of PEMSEA in the conduct of ICM programs at its ICM sites was strong, especially during the first ICM cycle. This was a deliberative strategy. This period was very crucial when the fundamental elements for seamless planning and implementation were set up, made available, became operational, and/or adopted, including: a project management

office, a coordinating mechanism, delineation of a management boundary, an initial state of the coast or profile, a strategy/action plan in achieving shared vision and mission, and a monitoring mechanism.

The first cycle was very important as significant management issues (and tools) were framed (and learned). At this stage, the enabling environments were created; the major limits to implementation were known; and the practical concerns were articulated: who was responsible; were roles clearly delineated; how can stakeholders participate; which core staff would be trained; what capacities were lacking; where to find money; among others.

From the second cycle onwards, when PEMSEA started to become less involved with site operations, deviation among sites existed but the cyclical process was maintained, though not as rigid as PEMSEA intended the process to proceed. The sites, by this time were appropriately trained and continuously mentored (and showed considerable credibility in implementing ICM), could confidently accommodate deviation especially when presented with emergencies, as well as windows of opportunity, without veering too far away from the ICM cycle.

The deliberative first cycle and intuitive next cycles, which mirror the deliberative (set up) phase and the iterative phase espoused by an adaptive management approach (Williams, 2011), were crucial to fulfill the requirements of, and comply with a standard ICM system as stipulated in the ICM Code; and to anticipate and manage the expectations when management interventions were implemented given complex and uncertain conditions.

Variations in local circumstances did not prevent ICM cycle implementation

The variety and diversity in ICM practice worldwide were shown to be a result of the different

contexts, nuances to and of local knowledge, and site-specific conditions of different areas (Sorensen, 1993; Cicin-Sain and Knecht, 1998; Olsen and Christie, 2000; Stojanovic, et. al, 2004; Chua, 2006).

Several snapshots of variations in PEMSEA ICM sites indicate the breadth of cultural, political and social differences, as well as limits accorded by individual and institutional capacities, which did not preclude successfully fulfilling the requirements of each ICM stage.

- Guimaras Province (Philippines) benefited from lessons learned from demonstration sites on how to streamline the development and production of its Coastal Strategy and, in the end, was able to shorten the process for its adoption.
- In Xiamen, through consultations during its first cycle, two strategic measures — the creation of coordinating mechanisms and the development of functional sea use zoning — were readily adopted and scheduled for implementation, although an entire plan was yet to be finalized.
- In Sihanoukville (Cambodia), a Regional Task Force Team (composed of expert-members from PEMSEA and Shihwa Lake, RO Korea, was set up to assist the PMO to increase its level of technical expertise in ICM. This meant that many activities were shortened with the advantage of external assistance. The PMO was able to continue later on with all the respective activities such as consultations and communication plans by themselves.
- Both Chonburi (Thailand) and Port Klang (Malaysia) signed their Memorandum of Agreements (MOAs) a year later than planned due to legal issues with their governments. To augment the delays incurred, some adjustments were made. For example, an activity, usually separately done, such as the production of an environmental profile, was included in the coastal management strategy as one activity.

- In Shihwa Lake, no project coordination committee was set up, instead the Shihwa Watershed Management Committee was set up in 2002 through national legislation to promote interagency dialogue.
- The Adoption stage in most cases is a formal process; but in some, a cultural adoption must take place. For example in Aceh, Indonesia, a Rasa charter was adopted, also known as *kanun* (canon) which is based on Islam. Another example is the Bali case, also in Indonesia.
- a better understanding on how ecosystems were responding to management interventions (Padayao, this volume; Esmas, et al., this volume);
- perception and attitudinal changes were registered among other stakeholders, like the scientists in Xiamen who recognized the importance of also providing interdisciplinary management-oriented research aside from doing purely disciplinary research (Chua, 1998); and among the private sector, which enhanced their corporate social responsibility mindset (Cardinal, et al., this volume); and

ICM's cyclical nature allowed improvements in methodology, approaches, and actions as practitioners gained experience and technical expertise

The ICM cycle strengthened the management regime through capacity development, over time. The fundamental tenet and operative word is incrementally. The first basic lesson was not aiming at addressing all issues within one cycle but focusing on prioritized concerns through risk assessment and management requirements of each concern. Through this strategy, interventions were phased and timed with due consideration of how technical knowledge and leadership skills were also progressing. As Visal, et al. (this volume) reiterated: “The ICM system helps to build capacities and can develop technical and leadership competencies in local practitioners so that they become effective agents of change.”³

As the ICM program matured, both the SDCA Framework and the ICM cycle provided robust, scaling up platforms to accommodate increasing (and evolving) needs and aspirations in the coastal areas. A number of “collateral” good outcomes were spawned, alongside the increase in competencies of the ICM practitioners:

- a strong, informed public constituency was formed (Narcise and Padayao, this volume; see Box 2).

Lessons Learned

Coastal and ocean policies are only as effective as their implementation

A paradigm policy shift to integrative collaborative coastal and ocean governance cannot exist in a vacuum. It needs the legitimacy which the public local administration confers; the credibility which ecosystem and science-based learning-by-doing approaches exhort; and the enhanced partnership which the strong public constituency (Christie, et al., 2005) and informed public coalition (Jentoft, 2007) offer.

It starts with a correctly understood and followed ICM cycle, to which an adaptive management practice tenet is applied: “A series of formalized and structured steps” (Schreiber, et al., 2004) and to which a public administration tenet is required, to coincide with planning and implementation processes of the local government.

³ See Visal, et al. (this volume) on the related capacity development initiatives undertaken at the different stages of the ICM cycle.

Box 2. The ICM cycle: its role in public engagement and how an engaged public keeps the cycle going (Aguinaldo, 2016).

Communication and information dissemination for the creation of an informed/engaged public have long been the foundations of the ICM cycle. However, based on documented experiences with PEMSEA sites, it was found that the main strategies employed in the ICM cycle can be modified for the goal of creating an engaged public. Conversely, it is this same public engagement which ensures the continuity of the cycle.

These stages are:

1. **Preparing.** All information pertaining to the basic concepts of ICM (e.g., issues/challenges, vision, benefits, case studies, etc.) are presented to stakeholders for the development of an ICM program that is tailored to their community. This also involves learning about the local culture and traditions, and assessing the public's current perceptions of ecosystem values and environmental management. From this information, effective communication plans/strategies are designed.
2. **Initiating.** As information-sharing continues, stakeholders prepare coastal profiles/SOC reports to identify issues, formulate objectives, specify the key targets of their intended programs, and predict expected outcomes. A communication plan is then developed to present the program to stakeholders and the public, which will serve as a guide in the conduct of various priority action plan activities.
3. **Developing.** As the communication strategy is implemented through information dissemination, stakeholders develop specific short, medium and long-term ICM plans/strategies based upon partner/network dialogues among the involved sectors.
4. **Adopting.** Promotion of potential benefits from ICM programs results in the acceptance and support of all stakeholders.
5. **Implementing.** As ICM implementation is enforced, the public is kept informed on the program's progress. Stakeholders are encouraged to join the public sector and provide each other mutual support in the development, implementation, modification and improvement of local conservation projects.
6. **Consolidation.** Regular meetings and submissions of up-to-date SOC reports are conducted to determine the program's progress and discuss any new challenges/needs that have arisen since its implementation. Such meetings will help in determining which issues need to be prioritized and which procedures are working and could be scaled up.

That starting point is the main strategy to counter the issue raised on how to sustain the ICM process and how it can be systematically (and strategically) done. As the initial batch of ICM sites conferred with Level 1 ICM certifications validate: Xiamen, Dongying, Batangas, Guimaras, Bataan, and others have already developed organizational routines to embed their ICM cycle in their day-to-day activities (Cardinal, et al., this volume).

The goal is to fully mainstream, and it begs the question: Will the ICM cycle end? Theoretically, it ends, but the functional, operational platforms continue. Philosophically, it doesn't matter, but the paradigm shift in mindset does. The name, the label, is forgotten; what is important is the recognition of the significant role and contribution

of ICM in operationalizing integrative and collaborative frameworks.

Other ways forward for local governments are: (a) to strengthen coastal governance as a service delivery mechanism; (b) to develop a purely economic perspective (e.g., incentive or financial support models) (Taljaard, et al., 2013); or (c) to institute and implement marine spatial planning (as started in some PEMSEA ICM sites), coastal use zoning and its integration to land use planning. Xiamen has been successful with this initiative (Fang and Ma, this volume). Where Bataan was able to engage much greater stakeholder consultation for its coastal use zoning scheme, Batangas may need Bataan's support when implementing its scheme.

Faithful adherence to the cycle is in itself capacity development

A structured manner for learning by doing provides continual improvement commencing with the concomitant increase in experience, knowledge, and capacity. Alongside learning how ecosystems respond, new studies have shown the primacy of capacity development within an ICM cycle: “the framework or programme cycle guides or structures the actor dialogue process along a number of steps, including visioning, assessing, strategizing, planning, implementing and reflecting” (Taljaard, et al., 2013).

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Integrating ICM into the Planning Process of Local Governments

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Key Message

- Successful demonstration of the effectiveness and impacts of integrated coastal management (ICM) programs enhances adoption of sustainable development concepts into the local government planning process. This also increases local political commitment towards sustainable coastal and marine development.
- The integration of ICM into long-term development planning is facilitated through the adoption and implementation of a vision-based Coastal Strategy and/or Strategic Environmental Management Plan.
- The key steps of the ICM cycle are designed to increase the impacts of ICM initiatives, and the integration of environmental concerns and priorities into local development plans.

Abstract

The experiences of four ICM demonstration sites (Batangas, Philippines; Chonburi, Thailand; Da Nang, Viet Nam; and Xiamen, PR China), their replication, and subsequent scaling up suggest that the integration of ICM — a holistic, integrative, well-coordinated, vision-led, and result and process-oriented planning and implementation approach — into the local government's planning process ensures environmental sustainability over a longer term.

Factors contributing to ICM integration include:

- involvement of local government;
- visible achievements and impacts;
- enhanced values of integrated planning and management approach;
- leadership role of the coordinating mechanism;

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- vision-led programs;
- key steps of the ICM cyclical process;
- stakeholders' partnership;
- sustainable financing;
- local champions;
- enhanced policy and functional integration;
- enactment of ICM-related national policy and legislations;
- local and political commitments; and
- meeting sustainable development objectives.

This case study analyzes the application and achievements of ICM implementation in four demonstration sites. It examines how ICM facilitated vertical and horizontal integration as well as the dynamics and process of transforming key elements of ICM into local plans and distill lessons learned.

Background

Coastal areas are major socioeconomic zones that facilitate the growth of ocean-based economies. These areas are vulnerable to overexploitation of resources and environmental degradation, which result in diminished supply of ecosystem goods and services.

The conventional approach to managing coastal development activities is sector-oriented, with various agencies dealing with the relevant problems in isolation from the others. The interconnectedness of coastal areas, physically and biologically, makes sectoral management inadequate in addressing the complex and overlapping problems.

ICM is defined as “a natural resource and environmental management framework which employs an integrative, holistic approach and an interactive policymaking, planning, and implementation process addressing the complex management issues in the coastal area” (PEMSEA, 2014). The ICM approach offers an alternative management option that effectively recognizes

the links between and among ecosystems and stakeholders. Over the past two decades, the operational methodology of ICM has evolved and further refined into an ICM system where its application has contributed significantly to achieving sustainable development at the local level.

Given the advantages of using the ICM system, this case study aims to show: (a) whether or not the ICM approach and coverage have been incorporated as an integral part of environment and natural resource management programs of local government; (b) how the ICM cycle (and the expanded plan-do-check-act cycle) has contributed to the planning process of local government; and (c) whether or not ICM has been fully internalized through the key approaches of demonstration, replication, and scaling up.

This case study examined the implementation of ICM in four demonstration sites, which have been practicing ICM for many years, namely Batangas and Xiamen since 1994, Da Nang since 2000, and Chonburi since 2001, to distill answers to the above questions. The analysis also focused on identifying key factors contributing to the integration of the ICM approach into local government plans.

Approach and Methodology

The performance of ICM implementation in four countries (PR China, Philippines, Thailand, and Viet Nam) was evaluated in terms of:

- a. The effectiveness of the ICM system and its contribution to capacity development and sustainable development goals – assessing the development of local capacity through ICM implementation and the significance in building a critical mass of local planners, resource managers, and expertise;
- b. The significance of ICM demonstration, replication, and scaling up as important stages for integrating ICM into government sustainable

- development plans – evaluating the necessity, effectiveness, and impacts of each site and their contributions to achieving sustainable development objective;
- c. ICM cycle as a critical and continuous planning, implementing, and evaluation process (Figure 1) – assessing the key stages of the ICM process in relation to continuous improvements and eventual integration into regular government plans of action;
 - d. Policy, legislative, and institutional arrangements at local and national levels – assessing the conditions leading to the development, modification, and improvement of related policy, strategies, legislation, and institutional arrangements as a result of widening management scope and approaches; and
 - e. Role of international/regional organizations in facilitating local and national efforts towards the adoption and implementation of the ICM demonstration, replication, and scaling up.

Results

The development and implementation of the ICM program requires the commitment and full involvement of the local government (PEMSEA, 2014). This case study enumerates the exemplary approaches that each demonstration site confirmed to be effective in achieving success in the ICM implementation and in integrating the ICM approach into the local government planning process (Table 1).

Figure 1. A simplified ICM cycle illustrating the key steps of ICM.

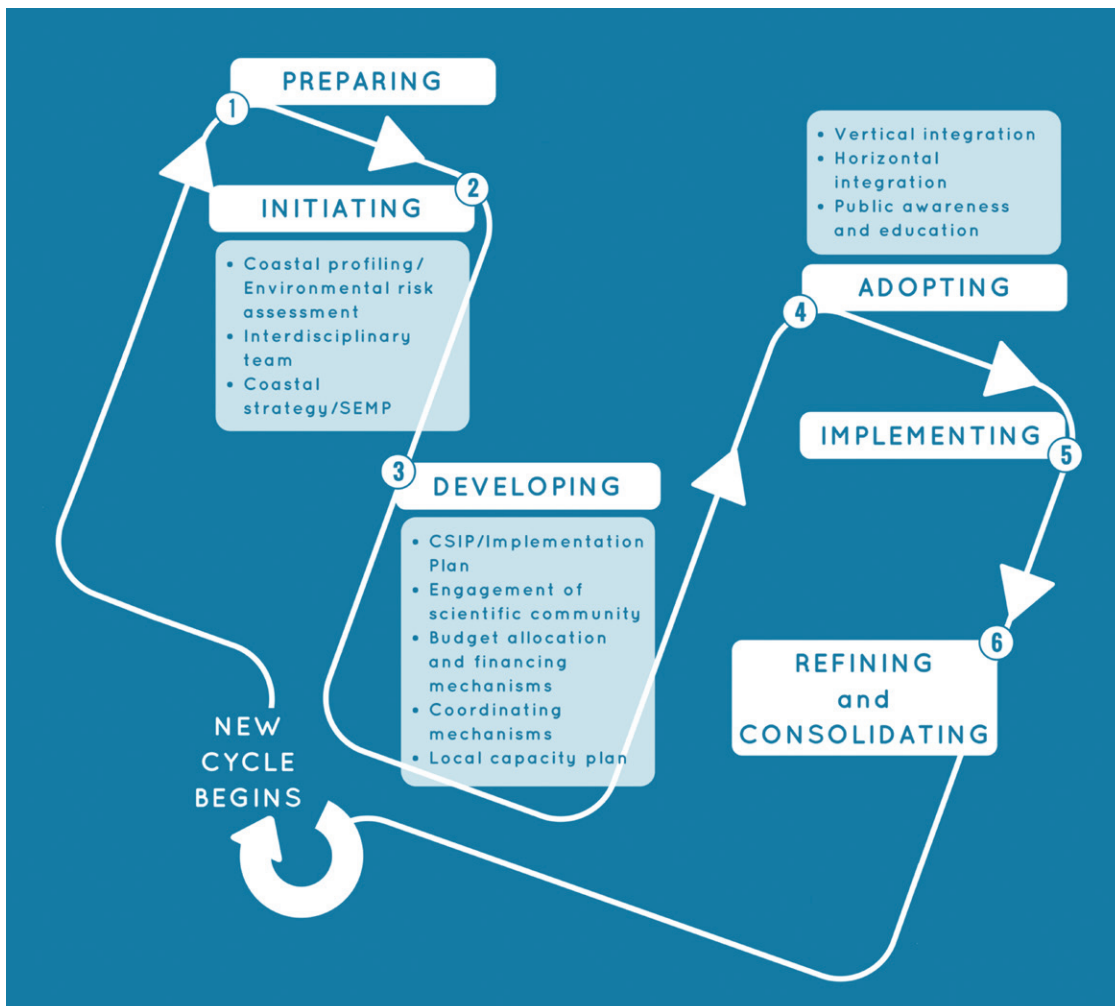


Table 1. Summary of achievements of the four demonstration sites with the integration of ICM into the planning processes, highlighting best practices from each ICM site.

Site	Coastal strategy/ strategic environmental management plans	Coordinating mechanisms	Government budget allocation for the ICM program	Engagement and mobilization of the public and other stakeholders	Local environment management/ development plans (integrated with coastal strategy plans)	Replication and scaling up of ICM plans
Batangas, Philippines	Strategic Environmental Management Plan (SEMP 1996–2020)	Batangas Environmental Protection Council (BEPC)	✓	Local fishers as MPA patrol guards, known as <i>Bantay Dagat</i> (Sea Patrol) which scaled up into Bantay Dagat Network	Batangas Comprehensive Land Use Plan (CLUP) and Physical Framework Plan (PFP)	Batangas SEMP updated and scaled up to include the adjacent bays and municipalities; adopted by the Provincial Legislative Body, 31 municipalities and 3 cities in the province in March 2007
Chonburi, Thailand	Strategic Management Plan for Marine Pollution Prevention and Management (SEMP)	Provincial ICM Coordinating Committee (PCC)	✓	Led by then Mayor Chatchai Thimkrajang and with the increasing knowledge, confidence in, and ownership of the Sriracha Municipality's Crab Conservation Program, the farmers, villagers, and seafood restaurant owners actively engaged and largely contributed to the program success; the program replicated in other local governments in Chonburi Province	The Crab Conservation Program incorporated in the local development plans and budget plans of eight local governments in Chonburi Province: municipalities of Sriracha, Saensuk, Sattahip, Laemchabang, Bang Phra, Banglamung, Bang Sarae, and Pattaya City	The Chonburi ICM Network now comprises 99 local governments, covering the entire province, and the noncoastal local government units
Da Nang, Viet Nam	Coastal Strategy of Da Nang City	Viet Nam Administration of Seas and Islands (VASI)	✓	Stakeholders' consultations and public awareness activities	The coastal use zoning plan for Da Nang City developed with objective of enhancing spatial planning of the city; addressed the resolution of the multiple uses of the city's beach area and other coastal resources, contributed to Da Nang's coastal tourism that balances conservation, economic, and social goals	Initiatives by central government to replicate ICM practices in 14 municipalities
Xiamen, PR China	Coastal Strategy Implementation Plan (CSIP); Strategic Action Plan (SAP) of 2005	Xiamen Marine Management and Coordination Committee (MMCC)	✓	In 1996, the Xiamen Marine Experts Group (MEG) formed by the municipal government to provide a venue to integrate scientific findings and opinions for policy and management decisions	Five-year Social and Economic Development Plans (FYPs)	Functional and geographical scaling up of integrated coastal and river basin management in Jiulong river basin

Note: ✓ achieved

Demonstration of the relevance and effectiveness of ICM has resulted in replication and scaling up in four countries.

All four demonstration sites were able to utilize the key components of the ICM system in designing, prioritizing, developing, and implementing policy, legislation, strategies, and action plans to address environmental and other key sustainable development challenges. The five key challenges were: disaster prevention and management; pollution; habitat protection and management; freshwater supply and management; and fishery resource management and livelihoods. They were addressed incrementally over time. Hence, both the holistic and integrative approach of the ICM system and the management issues addressed were highly relevant and readily acceptable by the local authorities at each site. Each demonstration site was able to:

- mobilize political commitments and stakeholder support in financing and participation in ICM activities;
- demonstrate that the ICM concept enabled a broad-based approach in managing environmental complexities and that the operational methodology was appropriate and effective for developing the necessary policy, legislative, and institutional arrangements to incrementally achieve management objectives;
- successfully demonstrate increased commitments, confidence, and willingness to participate and contribute among the various line agencies of the local governments and various stakeholders, thus forming the essential foundation for replication; and
- promote national commitment to develop national coastal/ocean policy, strategy, or legislation to adopt and utilize the ICM approach in achieving national sustainable development programs.

The successful implementation of the ICM program in Xiamen since 1994 demonstrated the feasibility of the ICM approach in addressing local challenges in a fast-developing nation; in particular, the key environmental

challenges arising from rapid economic development which had affected environmental quality, biodiversity, and ecosystem services. The holistic, system-based management approach coupled with strong political and institutional support, effectively transformed, restored, and rehabilitated the degraded environment in lagoons and bays of Xiamen (PEMSEA, 2006b). The visible impacts increased confidence and political support, which translated into a long-term strategy and improved operational methodology and financing in addressing other sustainable development challenges over the past 25 years.

The Batangas Bay Demonstration Project (BBDP) in the Philippines applied the ICM approach to the fast-developing areas of San Pascual, Bauan, Mabini, and Batangas City. At the end of the BBDP, the Strategic Environmental Management Plan (SEMP) of Batangas Province was updated and scaled up to include the adjacent bays and municipalities and was adopted by the Provincial Legislative Body, 31 municipalities, and 3 cities in the province in March 2007 (PEMSEA, 2008).

In Thailand, the demonstration area initially covered five municipalities — comprising 18% of the provincial coastline — and through consistent awareness, and capacity building and study visits to other ICM sites, ICM implementation in Chonburi was scaled up. By late 2008, all 26 coastal local governments became part of the Chonburi ICM Network. Eventually, in 2010, the network expanded to cover the entire province, including the noncoastal local government units, a total of 99 local governments (Kanchanopas-Barnette, et al., 2012; Barnette and Wiwekwin, this volume). The successful demonstration of ICM in the five municipalities was critical for the replication of the ICM program.

In Viet Nam, the success of the ICM implementation in Da Nang, was also recognized and thus set a good example for the replication of the program in other coastal provinces and cities in Viet Nam (Da Nang Coastalink, n.d.). Other established sites in the country included the provinces of Quang Nam and Thua Thien Hue (PEMSEA, 2016).

Following the key steps of the ICM planning cycle ensured the integration of coastal strategies and SEMP into the environmental and natural resource management plans of local governments.

All four ICM demonstration sites followed a cyclical process in preparing, developing, adopting, and implementing ICM programs under their respective local contexts. As the ICM system provides a framework of coastal governance involving environmental profiling and risk assessment, information disclosure, communication, and participation in decisionmaking, all SEMP and ICM plans were included in the development planning process of the concerned local governments and subsequently funded. Highlighted below are notable examples of planning in ICM programs, following the ICM cyclical process.

1. All four ICM sites developed their own coastal strategy and implementation plans, using the data from risk assessment reports/coastal profiles. In Batangas, the SEMP 1996–2020 served as a guide for the sustainable management of Batangas Bay (PEMSEA, 2006a; Padayao and Sollestre, 2009). In Da Nang, the coastal strategy provided short and long-term action programs designed to help resolve complex issues that beset the coastal and marine environment through cross-sectoral cooperation (People’s Committee of Da Nang City, 2001). In Xiamen, the SEMP for Marine Pollution Prevention and Management contained an appraisal of the causes and effects of identified environmental concerns and their associated risks; the evaluated management measures in place; and the possible options for intervention (PEMSEA, 2006b). In Chonburi, the Coastal Strategy Implementation Plan (CSIP) was eventually adopted by the five municipalities, which then catalyzed the scaling up of ICM implementation to the whole province (Kanchanopas-Barnette, et al., 2012; Barnette and Wiwekwin, this volume).
2. All sites created interdisciplinary technical teams to help undertake environmental risk assessments and develop coastal strategies and coastal strategy implementation plans (CSIP). The ICM program success in Xiamen entailed the active involvement of scientists and other experts who extended support from the startup phase to the present. In 1996, the Xiamen Marine Experts Group (MEG) was formed by the municipal government to provide a venue to integrate scientific findings and opinions for policy and management decisions. Composed of marine scientists, economists, and legal and other technical experts, the group was given the responsibility of providing expert and technical advice when needed. Information and findings from scientific studies provided the basis for the policies and decisions made by the Marine Management and Coordination Committee (MMCC) (PEMSEA, 2006b).
3. The interest of the local governments in implementing ICM goes hand in hand with allocating budgets for the programs and the coordinating mechanisms. Even after the first cycle of the ICM program was completed, the government budget allocation continued due to the integration of ICM and its relevant content into the local government plans and programs. The local government was able to explore other financing mechanisms to augment the financing requirements of the program implementation. In Batangas, along with the establishment of the *Bantay Dagat* (Sea Patrol), was the collection of diver fees, which started in Mabini and Tingloy in 2003. Mabini, Tingloy, and Calatagan established an environmental fund, utilizing the majority of fees collected for the management of the coastal areas and its resources (PEMSEA, 2008). In Xiamen, the Xiamen Sea Use Management Regulations mandated “the levy of sea use fee for six types of activities (i.e., engineering, industry, tourism, fishery, dumping, and other activities) (Article 4). The same regulation allowed the sea use fees to be used for sea area development and construction, conservation, and management (Article 19)” (PEMSEA, 2015a).
4. Setting up a coordinating mechanism was a critical step in the cycle. In Batangas, the adoption and implementation of the SEMP required and thus enabled the establishment of a coordinating

mechanism, the Batangas Bay Region Environment Protection Council (BBREPC). The BBREPC was a multisectoral body that provided the platform for coordination, conflict resolution, information exchange, and cross-sectoral relations between government and nongovernment stakeholders, including the fishers. The council served as the governing and policymaking body for the implementation of SEMP. With the scaling up of ICM, the council was expanded to cover two adjacent bays, Balayan Bay and Tayabas Bay. The council was then renamed the Batangas Environmental Protection Council (PEMSEA, 2014).

In accordance with the implementation of the Coastal Strategy of Chonburi (PEMSEA, n.d.), the provincial government established the ICM coordinating and management mechanism—the Provincial ICM Coordinating Committee (PCC).

The Xiamen MMCC was set up in late 1995 as an interagency structure. The creation of the coordinating mechanism resulted in the promotion of policy options and decisions based on priority concerns and available capacity, but with a realistic evaluation of the effects these had on the whole system: ecology, society, and economic sector. Not wanting the coordinating mechanism to be simply another layer of bureaucracy, Xiamen took early action to efficiently streamline the operations of disparate agencies by harmonizing interagency functions and operations. The improved efficiency helped to lower the delivery costs of services (PEMSEA, 2014).

5. Learning by doing is one of the key functions of the ICM cycle. Through progressive implementation of ICM programs over the cyclical process, a critical mass of local officials and local technical experts were trained. Concerned line agencies and research institutions involved were also able to improve their institutional capacity in environmental management. Batangas and Chonburi formally adopted local development plans to develop needed capacity for implementing their ICM plans. In Batangas, an ICM Training Center was established in 1999 under the

PG-ENRO, becoming a venue for study tours and cross-site visits from within the Philippines and other countries. The PG-ENRO staff conducted orientation and sharing of lessons learned and practical experiences in ICM implementation (PEMSEA, 2008). In Da Nang, local capacity building was one of the main thrusts of the ICM program through on-site training courses and workshops organized by PEMSEA, which included a number of national professionals and local experts as participants (Da Nang Coastalink, n.d.).

Geographical scaling up of ICM practices along national coastline was achieved through national coastal/ocean policy, strategies, and legislation

In the Philippines, the importance attached to ICM was exemplified by scaling up ICM through national policymaking and legislation. This in turn provided the conditions for mainstreaming ICM programs into the national development planning process. Presidential Executive Order 533 (E.O. 533, 2006) of the Republic of the Philippines, which adopted ICM as a national strategy for sustainable development of coastal and marine areas, also called for the development of coastal strategies and action plans that provide a long-term vision and goals for sustainable development of coastal areas. It required the mainstreaming of ICM into the national and local governments' planning and socioeconomic development programs with the allocation of adequate financial and human resources for implementation. The E.O. 533 also required the development of a national ICM program to implement the policy. The Department of Environment and Natural Resources (DENR), together with other concerned agencies, local government units, and other organizations initiated the Integrated Coastal Resource Management Program (ICRMP) in 80 coastal municipalities (DENR, 2012). A National ICM Program (NICMP) was proposed to expand its coverage to 832 municipalities. The major challenge, however, was the availability of funding support.

Similarly, the government of Viet Nam also recognized the contributions of ICM in the sustainable management of the coastal resources and the needs

to strengthen implementation by developing ICM policies, programs and legislation at the national level (Nguyen and Nguyen, 2014). The ICM scaling up program in North Central region and Central coastal provinces towards 2020 was accelerated through the integration of ICM into the revised Marine Environment Law and other relevant policy and legislation documents.

More specifically, the Law on Natural Resources and Environment of Sea and Islands, ratified on 25 June 2015 during the 9th session of the 13th National Assembly of Viet Nam, mandated the development of the National Strategy on Sustainable Exploitation and Use of Marine and Island Resources and Protection of the Marine and Island Environment covering a 20-year period with a vision for 30 years (PEMSEA, 2015b).

Coastal strategies and strategic environmental management plans developed during the demonstration phase were integrated into the development plans of the respective sites

The Batangas Province SEMP 2005–2020, a deliverable during the first phase of the PEMSEA Project, was incorporated into the comprehensive land use plan (CLUP) and Physical Framework Plan (PFP) (Box 1) of the province (PEMSEA, 2008).

The SEMP in Xiamen served as a framework for the specific action plans in different sectors in accordance with the local planning process. Based on the Strategic Action Plan (SAP) of 2005, Xiamen developed and implemented a series of ocean-related operational plans to achieve the objectives, including a marine functional zoning scheme, protection and exploitation of uninhabited islands plan, marine environmental protection plan, wetland conservation plan, and a program on the rehabilitation of tidal flats (PEMSEA, 2006b). The operational plans under the SAP provided the basis for the development of five-year plans for the ocean sector (Box 2).

Stakeholders were successfully mobilized and engaged in the implementation of the ICM programs

To effectively implement an ICM program, stakeholders should be educated and engaged throughout the ICM cycle. Cultivation of their positive attitude towards the environment contributes to the effectiveness of ICM implementation as they become collaborative partners with the local authorities in the preservation and management of the environment.

The establishment of marine protected areas (MPA) in Mabini, Batangas Province, engaged the participation of stakeholders, particularly fishers whose livelihoods were affected by MPAs. After a long process of awareness-raising about the benefits of an effectively managed MPA, including local revenue from tourism and other related activities, the community's perception changed, resulting in the establishment of the first marine sanctuary, Twin Rocks, in Mabini in 1991. The fishing community was encouraged to help maintain MPAs as members of *Bantay Dagat* (Sea Patrol). A series of capacity-building activities were conducted in the community to provide the members with information on the environment and fishery laws as well as the values of and threats to the marine coastal resources (Padayao and Sollestre, 2009).

Box 1. CLUP and PFP in the Philippines. (Source: HLURB, 2006)

The national, regional, and provincial PFP are policy-oriented and indicative in nature, where different land use categories such as forest lands and agricultural lands are categorized into protection and production land uses. The broad allocation of land uses in the level of PFP is treated in detail in CLUP.

Comprehensive land use planning is a constitutionally supported undertaking in the Philippines. The state declares its land use policies and principles in terms of relation to national economy and patrimony as well as its police power for the promotion of public health, public safety, public interest, public order, and general welfare.

Box 2. Five-year planning process in China.**(Source: USCBC, 2015)**

Five-Year Social and Economic Development Plans (FYP) are drafted and implemented by central, provincial, local, and district governments. The central FYP and targets are drafted by the National Development and Reform Commission (NDRC) in coordination with line ministries. Specific economic targets are GDP growth rates and social development goals. Targets are established in consultation with experts from the academe, industry, and other government ministries. The Chinese government works closely with regulators to draft a number of industry-specific FYP in fields like financial services, environmental protection, etc. These plans can have very detailed goals and are often circulated after the release of the central plan, and will serve as the basis for development of plans at local levels.

With the expansion of the ICM program to a bay-wide scale, and in accordance with the Verde Passage Management Framework Plan, the MPA Networks were created. Similarly, a *Bantay Dagat* Network in the coastal municipalities was also established to consolidate the coastal enforcement efforts in the province. Finally, almost all the 15 coastal municipalities in Batangas became a part of the *Bantay Dagat* Network (PEMSEA, 2008).

In Da Nang, a notable impact of the ICM program was manifested in the gradual change in the people's mindset towards the environment and natural resources. More citizens, including local policymakers, recognized the value of the coasts and oceans and the threats associated with resource exploitation and degradation. To some degree, there was also an appreciation of the ICM approach involving all sectors, including policymakers, scientists, civil society, and the communities, which was catalyzed through consultations and public awareness activities (Da Nang Coastalink, n.d.).

ICM programs catalyzed donor contributions and external collaboration

In 2005, Conservation International (CI)-Philippines initiated a marine biodiversity program in the Verde Island Passage Marine Biodiversity Conservation Corridor as part of the Sulu-Sulawesi Seascape Project. Since the SEMP was adopted by the province, it was used as the environmental strategy for CI-Philippines to implement its program in the Verde Island Passage Marine Corridor (VIPMC). The Batangas Province SEMP became a major component of the Verde Passage Management Framework Plan. The existing MPAs in Batangas, which are within the bounds of the Verde Island Passage, were further expanded to cover the entire Verde Island Passage (DENR-PAWB, 2009). The network aimed to enhance the effectiveness and functionality of MPAs in promoting sustainable livelihood for fishers and protection of coastal resources (Padayao and Sollestre, 2009).

PEMSEA played an important facilitating and catalyzing role in the development of ICM demonstration and subsequent replication and scaling up

The successful implementation of ICM in the four countries was largely facilitated and assisted by PEMSEA, in particular by promoting the concept of ICM and providing initial catalytic funding to initiate, develop, and implement their ICM programs. The role of PEMSEA was critical in the early phase of ICM program development and implementation as well as in promoting the national coastal/ocean policy and strategy.

The agreement between the local government and PEMSEA to partner in the development and implementation of ICM was an important step towards the integration of ICM into the planning process. When proven successful at

the demonstration level, it built the confidence needed for the ICM scaling up along with institutionalization of the coordinating and implementing mechanisms, and the incorporation of the strategy and management plans into the broader developmental framework of the local government.

Lessons Learned

Demonstration is an effective approach towards replication and scaling up

PEMSEA's approach to engaging countries to adopt ICM in addressing the complex coastal development challenges started with the demonstration of ICM efficiency and effectiveness at a relatively small spatial and administrative scale. After success was established and confidence was gained, replication to other coastal sites and, onwards, scaling up was possible.

The scaling up of ICM meant that the success of on-the-ground initiatives of local ICM implementation was recognized by both the local and national authorities. This promoted its adoption at the national, subregional, and later, at the regional level, by demonstrating to local governments that the ICM framework and process not only results in environmental benefits but also social and economic gains.

ICM cycle is a useful and effective process to guide the preparation, development, adoption, implementation, and followup to ensure internalization of concept and integration of ICM strategies and plans into the local government planning process

The key factors driving the integration of ICM into the development planning process of local government units are embedded in the ICM cycle, including: (a) leadership role of local government; (b) visible achievements and impacts; (c) values of integrated planning and management approach; (d) coordinating mechanism; (e) vision-led programs;

(f) stakeholders partnership; (g) sustainable financing; (h) local champions; (i) policy and functional integration; (j) national policy and legislations; and (k) local and political commitments.

The adoption of the coastal strategy (CSIP/SEMP) at the provincial level, as in the case of Batangas and Chonburi by their provincial governments, ensured that the plan was vertically integrated at the local government level. The adoption of the strategic plans not only strengthened the effectiveness of implementation, but also enabled funding by the government. The horizontal integration of SEMP or coastal strategy into a CLUP, ensured due consideration of the sustainable development challenges and eventually catalyzed financing through investment programs. Experiences from the four sites showed that efforts in achieving sustainable development objectives would be incomplete if CSIP and SEMP were not integrated into the government planning process.

Legislation and policies can be catalysts for ICM integration into the local government's planning process

In the mainstreaming of CSIP and SEMP, the enactment of national or local legislation and policy can make a real difference as demonstrated by E.O. 533 (Philippines), and the Law on Natural Resources and Environment of Sea and Islands (Viet Nam). In addition to ICM plans, these policies and legislation facilitated the implementation of ICM programs as more aspects of governance, sustainable development, partnerships, and ICM code were included. Legislation and municipal ordinances also reflected the commitment of the local government in the implementation of ICM. Most importantly, when legislations supported the various ICM mechanisms and activities, and budget allocations were in place, the ICM approach was effectively integrated into the planning process.

Public awareness and education can mobilize supportive stakeholders who are engaged in sustainable management of resources

The "public" stakeholders engaged in the sustainable development of the coasts were educated about the value of coastal and marine resources, the existing environmental issues, the rationale for sustainable coastal

management, and their role in the conservation of these resources. Once this was achieved, their engagement in various environmental activities created a sense of ownership, custodianship, and confidence in the ICM program and its positive effects.

Institutionalizing an effective coordinating mechanism is a necessary step in fully integrating ICM into the local planning process

The experiences of the ICM sites showed that the institutionalization of the coordinating mechanisms was a nonnegotiable target of ICM practice. This made the ICM program sustainable, since the coordinating mechanism was integrated into the local government's implementing agency and the local development plan. With a stable and permanent coordinating mechanism, the local government was able to implement priority action plans according to its own timeframe, capacity and resources.

Through the success of the ICM program, particularly in the early cycles, confidence in the ICM approach was built, resulting in enacted legislations and enforced policies. This, in turn, led to the institutionalization of the coordinating mechanism, since the integration into the local government was backed up by law such as a provincial ordinance.

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Leveraging Public-Private Sector Partnerships in ICM through Corporate Social Responsibility

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Key Message

- Increased private and corporate sector consciousness in sustainable development initiatives can result in increased environmental investments. This provides new opportunities for national and local governments.
- Integrated coastal management (ICM) is a practical platform for implementing private and corporate sector social responsibility initiatives. It enables the sector to identify and contribute to social, economic, and ecological objectives that are highly relevant to their respective businesses and the communities in which they operate.
- Innovative public-private partnership arrangements among national agencies, local governments, communities, and the corporate sector can enhance marine and coastal governance through shared values, responsibilities, and investments among the partners.

Abstract

Currently, there is an increasing trend in the private and corporate sector consciousness for the need to pursue sustainable development initiatives. Through their corporate social responsibility (CSR) arm, many corporations perceive this as an opportunity to create social and economic impacts in the community. On the other hand, many local governments have not been able to fully capitalize on the interests of the private and corporate sector to engage in environmental initiatives.

The public-private partnerships (PPP) in the Provinces of Bataan and Batangas in the Philippines as presented in this case study confirm the benefits of these collaborative efforts. The local governments were able to engage the private sector in the implementation of their respective ICM programs. The President of the Philippines also created Executive Order No. 533, an environmental policy encouraging the private sector's investment in sustainable

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development. With these developments, corporations were able to transform their CSR principles into ICM actions and eventually assumed leadership roles in the process, especially in mobilizing the private sector community.

The Bataan Integrated Coastal Management Program (BICMP) and the Batangas Coastal Resources Management Foundation (BCRMF) were among the outcomes of the partnerships. Some of their initiatives included solid waste management, coral reef rehabilitation, public awareness, and public participation (e.g., coastal cleanup).

The establishment of these PPP greatly contributed to the maturation of the ICM practice in both provinces. Nevertheless, the private sector efforts could still be improved through: better appropriation of private funds for social ends; inclusion of other stakeholders in PPP; venturing in CSR investment opportunities; and playing a more proactive role in ICM activities especially among the members of the private sector community.

Background

Corporations around the world as well as their shareholders are becoming increasingly conscious of the need for socially responsible behavior. While corporate objectives normally revolve around financial returns, many corporations see a social and economic value in making a difference in the community in the form of CSR (McElhaney, 2009; Cardinal, 2012). This creates an opportunity for the local government and the private/corporate sector to forge partnerships especially in pooling resources in project implementation to maximize social and environmental impact (PEMSEA, 2004; Cardinal, 2012).

Although there is a considerable increase in private sector participation in environmental initiatives, the potential to engage this sector has not yet been fully capitalized by local governments. This was evident

in many ICM sites with a low percentage of private sector participating in ICM programs compared to the total number of private sector situated in the ICM sites (Cardinal, 2012). A conscious effort was needed from the local government in order to tap the potential resources and expertise from the private sector (Erni, 2013).

Approach and Methodology

Local governments of Bataan and Batangas have engaged the private and corporate sector in the implementation of their respective ICM programs. The corporate sector contributed by:

- participating in the multisectoral coordinating council of the ICM program of the local government;
- providing input to planning and development activities of the ICM program;
- providing access to resources, skills, equipment, and facilities in support of ICM program activities and events; and
- acting as a catalyst to increase awareness and promote community and corporate participation in coastal resources management.

A number of good practices in corporate sector engagement demonstrated the effective collaboration between the local government and the corporate sector. The following were some key efforts undertaken by both, in Bataan and Batangas:

1. Create a policy environment for private sector investment in sustainable development. In the Philippines, ICM was adopted as the “national strategy to ensure the sustainable development of the country’s coastal and marine environment and resources” with the issuance of Executive Order No. 533 (2006). Section 7 of the policy provided that the corporate and private sector, among others, “shall be engaged in...planning, community organizing, research, technology transfer,

information sharing, investment, and training programs in the development and implementation of the ICM program”.

The national policy bolstered local initiatives in developing and scaling up ICM implementation in Bataan and Batangas Provinces, and highlighted the objectives and potential role that the private sector could and should play in the program. This cleared the way for more substantive efforts on the part of local governments across the country to better engage the private sector, with Bataan and Batangas providing on-the-ground examples of how the local government and the private sector both benefited from this shared responsibility.

2. Transform CSR principles into ICM actions.

While businesses and corporations worldwide were increasingly becoming responsive to standards of socially responsible behavior and sustainable development, the private sector needed to better understand ICM and the opportunity it provided for greater on-the-ground actions, leading to improvements in governance and management of coastal and marine areas, resources, and economies. A deeper understanding of the ICM framework opened doors of opportunities for companies where they could maximize their CSR investments and initiatives.

The following actions were employed by the ICM Project Management Offices (PMO) to better engage the private and corporate sector:

1. identifying/understanding objectives of existing CSR programs within the ICM site;
2. organizing individual/corporate briefings with existing CSR practitioners to build awareness of ICM and its objectives, and how the private sector can get involved;
3. engaging corporations in planning and development of ICM programs, including coastal strategy/coastal strategy implementation plan (CS/CSIP);
4. in collaboration with local government, corporates, and other stakeholders, delineating specific actions for CSR/private sector initiatives within ICM governance mechanism and CSIP; and
5. forging partnership agreements with corporations/foundations of corporates to implement specific actions within CSIP, including, for example, commitments to awareness building, biodiversity conservation and restoration, pollution reduction, food security, alternative livelihoods, and climate change and disaster risk reduction.

3. Find a corporate champion to mobilize the private sector/corporate community.

In Bataan, Petron Corporation recognized the potential value and benefit of ICM in relation to its CSR program (Petron Corporation, 2011, 2012). Petron did not merely participate as a stakeholder, but assumed a leadership role in the process, rallying other members of the corporate community. Eventually, the corporate sector established the Bataan Coastal Care Foundation, Inc. (BCCFI), comprised of 15 corporate members, supporting the ICM program. This was a remarkable display of commitment to the ICM program, in partnership with the Provincial Government, which continued for more than 12 years (Erni, 2012, 2013).

Results

Province of Bataan

The BICMP showcased the effective partnerships among various stakeholders in the Province of Bataan, including the private sector. BICMP actions included annual coastal cleanups, improvements in solid waste management, establishment of sewage treatment facilities, support for livelihood programs, and the formulation and enforcement of the Coastal and Land-Sea Use Zoning Plan (CLSUZP) of the province (Erni, 2012, 2013).

The provincial CLSUZP was developed and adopted in 2006 with the support of BCCFI. It served to identify and protect designated uses of coastal areas (land and sea), eliminate illegal and uncontrolled use of those areas, and reduce adverse environmental impacts of coastal activities. It also helped to address the multiple resource use conflicts in Bataan, including informal settlers, illegal and destructive fishing methods, land and sea-based pollution, and degradation/destruction of habitats and consequential impacts like siltation and sedimentation.

In addition, a series of tangible and intangible outcomes of the PPP in Bataan resulted in: (1) demonstrable improvement in environmental conditions in Bataan; (2) strengthening of development and management of coastal areas through sharing of corporate expertise and technical and scientific support; and (3) long-term solutions toward sustainable development (Box 1).

Indeed, the Provincial Government of Bataan and the private sector's efforts paid off, as BICMP was repeatedly recognized as an ICM model worthy of replication nationwide and in the East Asia region, with numerous awards and citations for Petron as the lead private sector collaborator in the program.

Province of Batangas

Over the years, significant progress was made in expanding the Batangas Province's ICM strategy for sustainable development of the coastal and marine areas, in collaboration with the private sector and other stakeholders. A key player in the program, BCRMF was established in 1991, through the efforts of the provincial governor and five of the largest companies in the province: Pilipinas Shell, Caltex Philippines, Chemphil Albright Philippines, AG&P Inc., and General Milling Corporation. The BCRMF initially organized events to raise awareness on the coastal and marine environment of the Batangas Bay, though lacking in strategy

Box 1. Key accomplishments of Bataan Province and BCCFI. (PMO-Bataan ICM Program, 2006; Erni, 2012, 2013)

- At present, BCCFI has 15 member companies.
- Implementation of Bataan's CLSUZP with technical descriptions for the establishment of municipal water boundaries was certified by the National Mapping and Resource Information Authority, and a unified zoning ordinance was drafted with the objective to govern the CLSUZP implementation for the whole province.
- Integration of the Land and Water Use Development Plan for the Municipality of Abucay as part of the Comprehensive Land Use Plan was completed.
- Mangrove planting was conducted annually, covering a total of at least 45 ha, with 47,000 seedlings and 337,000 propagules planted.
- Regular coastal cleanup activities were conducted covering 156 km (about 83%) of the 188-km coastline of the province.
- Regular Talisay River cleanup was completed, which is a major tributary of Manila Bay.
- The Ecological Waste Management Program was established.
- Artificial reefs (at least 600 units in the municipal waters of Limay, Mariveles, and Orion) and fish sanctuaries were established.
- Bataan was identified as a birdwatching site in the Philippines with over 12,500 bird count and 38 species (2015).

relative to coastal resources management (CRM) (PEMSEA, 2006).

The selection of Batangas Bay as a national ICM demonstration site in 1994 provided a more focused direction to the foundation and served as a channel for private sector investment in ICM. A Project Coordinating Committee was organized to coordinate

the implementation of the ICM program (i.e., the committee eventually evolved into the Batangas Bay Region Environmental Protection Council [BBREPC]), which created an effective platform for the private sector to participate, channel its expertise, and better define the objectives and expectations of its CSR program. The corporate sector became an active participant in the BBREPC, including the planning and development of the ICM program (Chua, 2006; PEMSEA, 2006).

As an active participant, BCRMF provided funds, staff, and other logistical support for the implementation of the ICM program, covering such activities as public awareness, coastal cleanups, coral reef rehabilitation, and monitoring of environmental changes in Batangas Bay. Other companies such as First Gen, Inc. and the Malampaya Foundation were also active private sector partners, whose activities included artificial reef monitoring, mangrove rehabilitation, waste management, marine protected area management, biodiversity conservation in the Verde Island Passage, disaster preparedness and response, and capacity building for waste management and law enforcement (Box 2).

The Province of Batangas scaled up its ICM program from Batangas Bay to the entire coastline of the province. Central to this feat was the proactive involvement of the corporate sector.

Lessons Learned

Public-private partnerships (PPP), which are broadly defined as collaborations between government and nongovernment actors to achieve mutually defined goals, offer one way to steer CSR funds toward coastal and marine development priorities of local governments. The ICM framework and process enhanced opportunities for collaboration between public and private sector partners, and based on the experiences of Bataan and Batangas, improved the targeting of private funds for social ends, thereby increasing the development impact of their CSR activities compared with independent CSR initiatives.

Extending PPP to include other stakeholders who are dependent on and/or benefit from coastal and marine resources can further increase the impact of

Box 2. Support made by First Gen, Inc. and Malampaya Foundation to the Province of Batangas.



Calatagan Sea Patrol



Nasugbu Sea Patrol



Calatagan Rescue Operation



*Mabini-Tingloy Joint
Rescue Operation*



*Mabini Sea Patrol with local
Philippine National Police*

the partnership investment and ensure sustainability. While PPP can enhance the development impact of CSR, partnerships that embrace a participatory element may further advance social goals. The Bataan and Batangas experiences demonstrated the benefit of involving coastal communities, universities, local groups/organizations and other members of the community (i.e., women, youth, fishers) under a coordinating mechanism to plan and implement ICM programs, in which:

- Government partners were oriented toward general development goals (i.e., social, economic, and environmental benefits) in the coastal area;
- Private partners brought the business acumen into the planning and implementation process; and
- Community representation ensured consideration of local priorities, risks, and benefits in the program.

Engaging these different stakeholders in a partnership reduced project costs, targeted benefits across sectors, and improved sustainability as the local community gained greater ownership over project activities.

CSR investment opportunities facilitated by the local governments through policy reforms encouraged private sector investment. Some of these opportunities included: (1) solving environmental problems at the community level (e.g., pollution control, waste management, restoration of habitats, access to safe drinking water); (2) developing sustainable environmental enterprises (eco-tourism, sport fishing, and sustainable aquaculture, manufacturing, and trade); (3) strengthening and facilitating the participation of Small and Medium Enterprises (SMEs) and informal enterprises; and (4) “living” with the universal principles identified in Agenda 21.

Quite understandably, the corporate sector needs to establish the business case for its CSR activities. As the concept of CSR continues to evolve, so are the means and tools to quantify the benefits — perceived or otherwise — that should aid them in their decisionmaking. Clearly, the notion of “triple bottom line” or sustainable responsible business, along with the numerous CSR approaches and cost-benefit analysis methodologies suggest a growing regard for the environment and stakeholders.

A champion for ICM among the members of private sector. As in the case of Bataan and Batangas Provinces, there was a need for a champion among the members of the private sector—be it a corporation (Petron Corporation and First Gen) or an individual or prominent personality that provided a face to private sector participation in ICM. Greater involvement of corporations in ICM projects likewise enhanced their perceived social license to operate, decreased regulatory risks, and benefited from the sharing of resources, opportunities, and risks that ICM partnerships brought. The benefits to corporations were greatly enhanced through corporate networking as demonstrated in [Box 3](#).

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Box 3. Benefits of a corporate network.

- The opportunity to advance sustainability solutions in partnership with a range of stakeholders, including the PEMSEA Network of Local Governments (PNLG), UN agencies, civil society, labor, and other nonbusiness interest groups.
- Access to opportunity briefs for corporate responsibility from PEMSEA publication; national and local governments; and PNLG on programs to be initiated and implemented in the East Asian region.
- Institutional strengthening, capacity building, and information exchange on skills, best practices, and knowledge related to the ICM implementation as a framework for corporate social responsibility systems.
- Opportunity for award and recognition for initiatives on practices related to ICM and the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA).
- Branding of company-funded projects with an international development agency.

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Private Sector Participation in Addressing Sustainable Development Challenges in Cambodia, Indonesia, Philippines, and Thailand

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Key Message

- Attracting the corporate sector and involving them as key stakeholders in planning and implementing sustainable development programs at the local level can facilitate increased access to human resources, funding, and technical expertise for the local governments and communities.
- Experiences in Cambodia, Indonesia, Philippines, and Thailand showed that both the local government and private companies operating in the local areas can share responsibility and resources in addressing sustainable development challenges.
- Under the integrated coastal management (ICM) framework and processes, local authorities (e.g., municipalities, districts) and stakeholders, including concerned private sector, can be involved in program development and eventual

implementation. As such, the private sector benefits from the opportunity of interacting with policymakers, concerned government agencies, and the local communities for a better understanding of their concerns and expectations.

Abstract

Sustainable development initiatives are being implemented across East Asia in the coastal and marine sector. In recent years, the private sector has been involved with such efforts through the corporate social responsibility (CSR) arm of their companies. This corporate governance allows the private sector to partner with local governments, nongovernment organizations (NGO), and communities to aid sustainable development programs. The ICM framework and processes provide the means for the local governments and stakeholders to build consensus, involve parties in the planning process, organize

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roundtable discussions, and agree on actions. These would increase collaborative efforts and encourage the private sector to play a more active role in sustainable development in East Asia. The rehabilitation efforts in Thailand, habitat protection programs in the Philippines, coral reef conservation in Bali, Indonesia, and solid waste management in Cambodia are some of the success stories after the ICM program was implemented in these areas. The present study highlights how the private sector's participation contributed to achieving the goals of sustainable development programs.

Background

Several problems arising from unregulated or inadequately managed coastal and maritime development continue to threaten the environmental quality of the East Asian seas and their coastlines, not only affecting biodiversity but also the functional integrity of the coastal and marine ecosystems therein, causing socioeconomic and management complications (Pido, et al., 2011). Some of the key environmental challenges include habitat destruction, increased pollution, and decrease in species biodiversity, especially in coral reefs (Roberts, et al., 2002) and mangrove forests (Valiela, et al., 2001). Affected coastal areas consequently have negative impacts on the living resources, livelihood, and quality of life of nearby communities (Padayao and Sollestre, 2009; PEMSEA, 2006).

Some private companies have independently begun “corporate governance” with respect to their targeted coastal area through specific project funding and supervision. For example, in the Philippines, the Bank of the Philippine Islands (BPI) partnered with the World Wide Fund for Nature (WWF) to conduct risk assessments on climate change and its effects on the cities of Baguio, Cebu, Cotabato, and Iloilo as well as identifying subsequent environmental hazards,

socioeconomic susceptibility, and adaptability concerns (Cruz, 2011). Similarly, in Thailand, Siam Compressor Industry Co. Ltd. (SCI) participated in mangrove rehabilitation and crab release in the Laem Chabang District in the province of Chonburi (Mitsubishi Electric Corporation, 2014). Likewise, local governments took strong initiatives to address their respective environmental challenges. For example, the Xiamen City government (PR China), imposed sea area usage fees on all commercial users and penalized those who exceed waste disposal standards (Uychiaoco, et al., 2009).

In order to further improve the conditions of the community and the natural resources on which they greatly depended on, the private sector, in exercising their CSR, could collaborate with local governments and contribute to their sustainable development programs. Through the ICM framework and processes, local municipalities and stakeholders (e.g., private sector) are adequately consulted and involved in program initiation and eventual implementation (e.g., through PEMSEA public-private partnerships procedures) (Table 1). Through this approach, both the local government and private corporations could share responsibility in developing projects catering to their respective coastal communities. One example is by pooling resources in assessing the environmental and socioeconomic status of each area (Whisnant, 2014). By attracting the corporate sector and involving them as stakeholders in planning sustainable development programs, funding and technical expertise could be made available to the local executives and communities through training, capacity development, information dissemination, and marketing of managed resources (Salayo, et al., 2008).

Approach and Methodology

Several ICM practices in East Asia had successfully involved private corporations operating at the concerned areas. This study reviewed such practices

Table 1. Summary of PEMSEA PPP procedures (Cruz, 2011).

Procedure	Description
Scoping and consensus building	Address community, local government, and private sector concerns
Packaging, promoting and networking	Target areas for private sector to aid
Roundtable and selecting partners	Discussions between private corporations and local government
Partnership building	Continued coordination between companies and local municipalities
Institutionalizing partnership arrangements, and developing and adopting a business plan	Memorandum of Agreement between public and private entities
Improving and sustaining	PEMSEA-monitored CSR Awards system based on "Evolution, Revolution, and Resolution"

in Cambodia, Indonesia, Philippines, and Thailand, with special emphasis to identify the following:

1. conditions favorable to the participation of the private sector in ICM programs – policy environment needed for private sector to actively participate; political and social conditions that contribute or inhibit private sector involvement;
2. appropriate approaches which lead to effective collaboration between public and private sector partnerships as well as approaches that motivate private sector interest and willingness to actively contribute to the ICM program activities;
3. role and contributions of the private sector in the planning and implementation of ICM programs like enforcing CSR and mobilization to support long-term sustainable development goals and objectives;
4. examples of good practices for demonstrating effective public-private sector partnerships; and
5. lessons learned from private sector participation.

Results

Increase in collaborative efforts between local government and private sector. Some examples of successful ICM programs were carried out in Bali (Indonesia), Batangas (Philippines), Chonburi (Thailand), and Sihanoukville (Cambodia). Local

governments and corporate sectors agreed to work together to finance projects, implement guidelines, share expertise and provide training for the community in addressing sustainable development challenges especially pertaining to habitat rehabilitation, fisheries, and waste management (Table 2).

Rehabilitation efforts in Chonburi Province, Thailand. In 2001, the Chonburi provincial government collaborated with the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) to develop and implement a pilot ICM program to demonstrate the effectiveness of the ICM approach. The local government-driven ICM program focused on the protection and rehabilitation of the natural resources and the environment. The municipalities involved worked in close cooperation with relevant line agencies, state enterprises, private sector, concerned communities, NGO, and educational and research institutions. Since then, coastal management efforts of the various sectors were able to minimize not only conflicts with one another but also duplication of activities. The Program Management Office of Chonburi implemented activities and annually reviewed the progress of ICM program implementation (Kangchanopas-Barnette, et al., 2012). Through the initial demonstration project—which involved five provincial municipalities, i.e., Sriracha, Saensuk, Laem Chabang, Koh Si Chang, and

Table 2. Summary of East Asian countries with collaborative efforts from the private sector.

Countries (Municipalities/ Provinces)	Issues	ICM Sustainable Development Aspects	Corporate Sector Involved	Implemented Programs	Improvements
Thailand (Sriracha, Bang Pra, Laem Chabang, Bang Sare, and Sattahip)	Low crab stocks	Food security and livelihood management	Fishermen's Association; Thai Oil Co. Ltd.	"Crab condominiums", protection of gravid crabs	Increase in crab catch
Philippines (Batangas Province)	Destruction of coral reefs from dynamite fishing; overfishing	Habitat protection, restoration and management; food security and livelihood management	First Gas (First Gen)	Marine protected areas; Sea Patrol (" <i>Bantay Dagat</i> ")	Increase in fish catch; discontinued dynamite fishing
Indonesia (Bali)	Decline in coral reef populations	Habitat protection, restoration and management	BTDC; NDRF	Artificial reefs and coral reef monitoring; "Adopt a Coral"; BUCP	Increase in cultural and environmental awareness; ecotourism
Cambodia (Preah Sihanouk)	Ineffective solid waste management	Pollution reduction and waste management	Sihanoukville Tourism Association; Cintri	Daily beach cleanups; solid waste management	Environmental awareness and tourist influx; treatment of solid waste

Chaoprayasurasak (now Aoudom)—an equivalent of 18% of coastal communities in Chonburi province, more coordination and cooperation occurred between local administrations and associated stakeholders, including private sector.

The implementation of the Chonburi Coastal Strategy and action plans heightened public awareness, promoted greater cooperation between agencies and sectors, streamlined management actions in achieving common visions, thus leading to optimization of financial and human resources, strengthened institutional management capacity, and building up of a critical mass of local officials and key stakeholders for undertaking present and future management challenges.

In 2006, the Sriracha Municipality and the fishers' association initiated a crab conservation program (i.e., "crab condominiums") to help increase blue swimming crab (*Portunus pelagicus*) populations for sustainable harvest of this once overfished crab species (Johl, 2013). Other municipalities such as Bang Pra, Laem Chabang, Bang Sare, and Sattahip

were also involved in a similar project (Kanchanopas-Barnette, et al., 2012). When more crabs were caught in 2007 than the previous year, the fishing community began to realize that this increase could be the result of responsible harvesting and conservation promoted by the projects (Suanrattanachai, et al., 2009). Promotional activities for the communities, like juvenile crab releases on the birthdays of the King and Queen, finally encouraged the participation of private companies (e.g., Thai Oil). Thai Oil not only provided financial aid for the crab conservation program (Kanchanopas-Barnette, et al., 2012) but also helped in developing and financing other environmental projects, such as the Ecological System Development Project and the Green Communication Project (Thai Oil Public Co. Ltd., 2013).

Innovative mussel farming systems were also developed along the coast of Sriracha Bay. Floating mussel farms were set up in Sriracha Bay resulting in additional income for the fish farmers. Subsequently, the concerned fish farmers formed an association to promote and sustain the new aquaculture practice. The association was able to secure technical assistance

from government institutions and universities such as Kasetsart University and Burapha University, specifically to better understand the biological and ecological requirements of green mussels. The Sriracha Municipality granted 200,000 Baht (US\$ 5,600) to Burapha University to study the epidemiology of mussels which suffered mass mortalities in 2007. The cooperation of local government, public universities, and fish farmer association to ensure sustainable farming strengthened a new form of public-private sector partnership.

Another form of partnership could be seen in the sea turtle conservation program which was implemented by the local government in close cooperation with the Royal Thai Navy. The Sea Turtle Conservation Center of the Royal Thai Navy releases sea turtles annually to their natural habitat with wide public participation. Under this program, the local municipality and the Royal Thai Navy set up a sea turtle hatchery to raise young turtles for release. The local fishers were encouraged to rescue sea turtles caught by fishing nets and kept in collection ponds in the city park where the turtles were fed and treated for wounds and diseases. The turtles from the hatchery and those from the collection ponds were then released back to the wild. The annual release of sea turtles was undertaken to enhance stakeholder awareness and participation in coastal resource conservation particularly to encourage the participation of local fishers, local citizens, private sector, academe, government agencies, and administrative units as well as the media (Kanchanopas-Barnette, et al., 2012).

Habitat protection and management in Verde Island Passage, Philippines. As a prerequisite of the ICM program, the provincial government of Batangas formed the Batangas Bay Region Environmental Protection Council (BBREPC) composed of representatives from local governments, other government agencies, communities, and private sector. This created an effective platform for the private sector to participate, channel its expertise, and better define the objectives and expectations of its social responsibility. As an active member of BBREPC, First Gen (through First Gas), a privately owned company, took the initiative and leadership among private sector for the marine

conservation of the Verde Island Passage, a world marine biodiversity center. First Gen assisted in the protection of this biodiversity-rich area, which includes Batangas, Oriental and Occidental Mindoro, Marinduque, and Romblon (First Gen, 2015) with partnership from NGO, especially Conservation International-Philippines (CIP) through the establishment of the First Philippine Conservation, Inc. (FPCI) to coordinate and implement joint activities (Rosales and Vergara, 2009).

This form of shared partnership assisted local communities with the Project Center of the Center (Project CoC) program, wherein local fishers are given financial and organizational support to assist in the management of the designated marine protected area (MPA). Collaborative efforts between First Gen and the concerned local government have also benefited fisherfolk through a series of activities including operational supervision (e.g., reconnaissance surveys) (First Gen, 2010); volunteer orientation (e.g., Planning, Implementation, Monitoring, and Evaluation [PIME] Training; Red Cross Emergency Training); funding for operational facilities (e.g., cellular phones, fuel, and global positioning system); and community services (e.g., education for children, operational support and accident insurance, legal counselling, and expenses of Sea Patrol [Bantay Dagat] volunteers) (First Gen, 2011).

First Gen, in collaboration with the provincial government of Batangas, USAID, CIP, and the Bureau of Fisheries and Aquatic Resources (BFAR), also implemented an award system to recognize local governments for effective governance and maintenance of MPAs (i.e., the Batangas Recognition Awards for Verde's Outstanding MPAs). With the help of local residents, monthly coastal cleanups are also carried out in Danglayan San Pascual, Santa Clara, and Santa Rita Aplaya (First Gen, 2013). Through the continued support of First Gen, local residents, like Nestor de Austria (Bantay Dagat vice chair of Mabini, Batangas), have seen an increase in fish catch: "...now we catch

not only many, but big tuna” (First Gen, 2011). Not only larger and more economically valuable species (e.g., skipjack, “*gulyasan*”) were caught, but also the practice of dynamite fishing had been discontinued (Padayao and Sollestre, 2009). Removal of such a destructive method of fishing helps impede the decline of coral reefs and aids in the rehabilitation of this habitat (Fox, et al., 2005).

Coral reef conservation in Bali, Indonesia.

Comparatively, the Bali Tourism Development Corporation (BTDC) in cooperation with Nusa Dua Reef Foundation developed a project that aimed to rehabilitate and restore the coral reef ecosystem in Nusa Dua and Tanjung Bena. The Coral Reef Conservation Project was BTDC’s main CSR program designed to combat the threats of destructive fishing practices, coastal development, and climate change (EAS Congress, 2012). Since 2009, 77 artificial reefs (Submarine Reef) were introduced to create a suitable substrate for coral recruitment and formation. Research was also conducted on associated fish and invertebrate communities to monitor the outcomes and progress of the project efforts. There was clear evidence of a resulting shift in pressure away from natural reefs and an increase in the number of marine organisms in Nusa Dua and Tanjung Bena (Komang, 2012).

Financial and operational aid from stakeholders, local governments, and other private sectors through “Adopt a Coral” program helped sustain the conservation efforts. Other activities and campaigns, like SCUBA training, beach cleanup, “Bali’s Big Eco Weekend”, and “Pledge An Act, Save Our Coral”, have also garnered support and awareness. In order to integrate the Balinese culture into the rehabilitation effort, the Badung Underwater Cultural Park was developed in 2012 to serve as a constant reminder of the need for marine conservation and community involvement. Here, local artists sculpted culturally themed

statues (e.g., *Kecak*) that were placed underwater (at a depth of 12 m) which also serve as alternative substrates for more coral adherence and as additional attraction for tourists.

Furthermore, BTDC is a committed member of the Coral Triangle Initiative, which is a conglomerate of six nations that promotes the need to conserve and protect the largest coral reef ecosystem with the highest concentrations of marine biodiversity (EAS Congress, 2012). By rehabilitating the coral reefs in Nusa Dua and Tanjung Bena, increase in tourism and fish catch were observed. These results benefited the local communities through continued sustainable development practices, public education, awareness campaigns, and marine conservation advocacy.

Proper waste management in Sihanoukville, Cambodia.

The advantages of public-private partnerships (PPP) were also observed in Sihanoukville, Cambodia, through the waste management programs (PEMSEA, 2008). The Sihanoukville Tourism Association (STA) has been active in aiding the cleanup of the city center and the beach areas since 2013. The STA organized a monthly cleanup campaign in collaboration with the provincial government and undertook “daily cleanup” with the help of 15 workers employed by the association (PEMSEA, 2015). More importantly, solid waste management (SWM) became a top environment management priority in Community Village No. 1 in Sangkat 4 Commune. The community paid for the SWM services which included hiring a local private waste management company (Cintri) for the collection of wastes and transport to dumpsites. Since the success of the first project phase, which involved 280 families, the project extended its coverage to 1,155 families from five villages. Favorable outcomes were observed (e.g., each household separated their wastes before collection). An SWM Fund (from

user fees) was established to strengthen the solid waste management program, including proper information dissemination to the community and coordination with the private sector. Consequently, the Commune Council of Sangkat 4 and the associated five villages were able to successfully implement a revised SWM program which promoted segregation, recycling, and composting of wastes (Soriano, 2011).

In 2007, the Cintri Waste Management Company entered into a PPP agreement with the Sihanoukville Municipal government by providing assistance to the SWM program implementation (Fee, et al., 2012). The Sangkat Council receives a portion of the total fees collected for management of primary collection, which it distributed among its waste collectors; a Revolving Fund was likewise established from the revenues of the solid waste management project. The program was beneficial to the residents of Sangkat 4 (1,110 households) because of the management of their solid wastes and increased cleanliness. Subsequently, this SWM project approach was adopted in other places such as Tomnob Rolok Commune of Stung Hav District and Preah Sihanouk Province. Capacity building and SWM orientation activities were further developed for academic institutions like the Hun Sen High School in Stung Hav. A SWM coordinating team from Sihanoukville was established to ensure effective implementation of the PPP agreement. This was headed by the commune chief of Sangkat 4 while the concerned local government officials and department heads served as members (Soriano, 2011). Despite these efforts, poor law enforcement and inefficient collection of fees from residents continued to challenge the smooth implementation of the SWM program. More effective public education on waste management as well as provision of adequate trash bins for waste collections were necessary (Fee, et al., 2012).

Lessons Learned

Lessons pertaining to outcome of PPP initiatives

- 1. Better appreciation for the private sector's initiatives strengthen commitments and partnerships.** The involvement of the private sector in advancing their CSR through active participation in environmental management under a broad ICM program framework creates positive impact with their partner stakeholders especially the local governments, NGO, and communities, and fosters stronger commitments and partnerships. Both First Gen and BTDC incorporated their CSR initiatives as part of the integral structure within their corporations. Both companies initiated the development of projects on habitat rehabilitation and livelihood organization in their respective areas. First Gen did not limit itself as a financier but also became deeply involved in project implementation as an active partner, including troubleshooting when implementation problems arose. For example, whenever the Verde Passage Project encountered problems, First Gen would be involved in troubleshooting or helping in redirecting the project. This shows the conscious effort of First Gen to be involved and remain committed. In addition to this, First Gen also introduced and shared its work ethics of rigor, efficiency, focus, and discipline in accomplishing tasks that are being learned by the First Philippine Conservation, Inc. (FPCI) and the Conservation International-Philippines (CIP). First Gen also shared its effective tool on communication with the general public (Rosales and Vergara, 2009).
- 2. Integrative collaborative governance broadens perspectives.** The implementation of ICM generates opportunities for local governments, private sector, schools, and other stakeholders to work closely with one another. This process enables stakeholders to expand each other's perspectives by giving support in terms of sharing information, knowledge and materials,

equipment, and collective implementation of approved projects. In addition, it strengthens collaborating partners to contribute their share based on their individual strengths. One good example is the involvement of local universities and research institutions as stakeholder partners in contributing to information gathering and technical expertise and also in building technical capacity needed for program implementation. In the case of Chonburi, local governments are working closely with universities (e.g., Burapha University, Fisheries Research Station of Kasetsart University, and Aquatic Resource Research Institute of Chulalongkorn University) to address various technical information needs to enhance decisionmaking (e.g., technical study on the impacts of sea-based transfer of cassava flour and other dusty commodities in Sriracha Bay; research to address sea turtle diseases in the conservation ponds; green mussel diseases; seagrass transplantation; oil spill impacts; ocean circulation). Furthermore, a couple of university faculty and staff were also involved in climate change research. They also served as facilitators for the dissemination of climate change knowledge and technical know-how for the local governments (Kanchanopas-Barnette, et al., 2012).

3. **Community involvement with the private sector.** The willingness of the community to partner with the private sector exhibits their commitment to cooperate and participate actively in activities that contribute to social benefits such as the Solid Waste Management Project in Sihanoukville, Cambodia, as demonstrated by the willingness of families who eagerly partnered with the local government and the private sector. The communities involved learned and appreciated that they were also playing an important role like the other stakeholders in the waste management initiative. They felt that they were not simply the beneficiaries of the project but that they also contributed to the improvement of human health and the environment (Fee, et al., 2012).

Lessons pertaining to the application of approaches and methodology contributing to building public-private sector partnerships

1. **Build consensus among stakeholders.** Continuous efforts in building consensus and participation of all concerned stakeholders were an essential part of ICM strategy especially in the development of PPP program. Baseline studies and partnership activities were aimed at building understanding and consensus among stakeholders for appropriate policy, regulatory, and institutional reforms as well as creating a conducive environment for PPP. As some local executives might have limited exposure to and experience with private sector participation in ICM programs, awareness building on some positive experiences with PPPs and common stakeholders concerns could be one of the options to build partnerships with the private sectors.
2. **Involve all concerned stakeholders (including private sector) in planning and implementation of sustainable development programs.** Collaboration among stakeholders and local governments in sustainable development programs would create a policy environment, which encourages concerned private sector to participate in fulfilling their CSR activities. Through the ICM framework and processes, local governments and private companies could join hands in developing projects that cater to coastal communities within their respective areas of operation. Such projects can be carried out by incorporating their resources in undertaking coastal surveys and assessments (Whisnant, 2014; PEMSEA, 2015) as well as on capacity development and information dissemination activities. Some corporate sectors could also contribute their technical and marketing skills in the process.
3. **Conduct roundtable discussions.** Roundtable discussions between local government and concerned stakeholders especially in the selection of the corporate sector could create a favorable

environment for partnership building through subjects of common interest including problems identification and solutions, common visions, goals and targets, and action plans. Such roundtable enables the private sector to have access to various local government agencies and key stakeholders. In fact, it provides opportunities and avenues for interaction with local government units.

4. Build and institutionalize partnerships.

Partnership is forged through roundtables, follow-on talks, and involvement in the planning, development, and implementation of ICM programs involving collaboration of local governments, public sector, and other stakeholders. Hence, it provides a foundation for institutionalizing a public and private sector partnership arrangement that could take the form of a memorandum of agreement. Such undertaking ensures sustainability of endeavors and areas of cooperation for long-term benefits.

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Engaging Civil Society Organizations in Sustainable Development of Coastal and Marine Areas through the Application of Integrated Coastal Management System

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Key Message

A review of several integrated coastal management (ICM) practices in the East Asian Seas (EAS) region clearly demonstrated that the ICM system is effective in:

- providing an opportunity for local governments to work directly with communities and community groups;
- developing the capacity of civil society groups and empowering them to serve as partners in the protection and management of their local areas and resources; and
- sustaining or even scaling up and replicating good practices beyond the initial project phase.

Abstract

The human factor, such as local people dedicating themselves to protecting marine and coastal areas and resources, is the most important element in protecting the local environment and the benefits it provides to the communities.

The lack of competence, awareness, and participation of community groups and civil society organizations, however, is a barrier to effective planning, implementation, and sustainability of development projects/ programs.

Local governments can overcome this barrier by partnering with these groups, developing their awareness and capacities, and proactively engaging them in sustainable development projects and initiatives.

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The process of ICM development and implementation, as advocated by PEMSEA facilitates local government engagement of civil society groups as stakeholders and partners. The engagement provides civil society groups the opportunity to express their respective interests, concerns, and needs. It also provides opportunities to contribute local knowledge and skills to the ICM program; build capacity in planning and management; improve livelihoods; and interact, network, and learn from other stakeholders.

It is important for local governments developing ICM programs to connect with civil society groups early in the ICM project cycle; identify their main areas of focus and the specific aspects where they can contribute to the ICM program; create opportunities and incentives for their participation; and invest in their capacity development, organizational strengthening, and sustainable engagement.

Meaningful engagement of civil society groups facilitates better understanding of issues and priorities that are important to coastal communities and how to address them; develops their capacity and empowers them to serve as partners of the local government; and encourages local acceptance and ownership of the program.

Background

Previous paradigms in environmental management provided limited recognition of the competition and conflicts arising from multiple interests and use of a limited space. They did not take into account the programming cycle and the political, social, and economic dynamics within which environmental management is subsumed. ICM is a natural resource and environmental management paradigm that integrates human activities and the socioeconomic web of a particular area. This inclusion changed the focus of environmental and conservation programs,

from looking primarily at species or the ecosystem, to consideration of their interface with human activities (Chua, 2008).

Such a shift in focus necessitates the involvement of various stakeholders, including civil society groups. Civil society, defined as nongovernment and not-for-profit organizations present in public life expressing the interests and values of their members (World Bank, 2013), can be community-based organizations (CBO), youth groups, associations, women's groups, and local and international nongovernment organizations (NGO) who have a stake in the use and management of the ecosystem.

As immediate users of coastal areas, civil society groups have a crucial stake in the development and implementation of ICM programs. As local stakeholders, they have a good understanding of local conditions and issues, and play an important role as users and managers of their surrounding natural resources (Gupte, n.d.). However, as their livelihoods are commonly dependent on healthy ecosystems, environmental degradation can adversely affect them including their health and well-being (UNRISD, 1994; Ohlsson, 2000; IUCN, 2003). In many cases, however, local people and civil society groups may also be marginalized in policy and decisionmaking processes related to the use and management of their natural resources and environment (Gupte, n.d.; Fordham, et al., 2011).

The challenge is how to transform civil society groups from being just bystanders into committed and valuable players in the development and implementation of ICM programs.

This case study focuses on distilling the good lessons and operational methodologies drawn from several ICM practices in the EAS region as well as those community-based Global Environment Facility (GEF) small grant projects implemented in the region. The outcomes of this analysis and the lessons learned are highlighted.

Approach and Methodology

PEMSEA has successfully assisted the countries in the EAS region towards achieving sustainable coastal development by developing and implementing ICM programs. The purpose of this study is to identify approaches and methods being employed by selected ICM sites in the region in involving and empowering civil society groups, in particular, when and how to involve them; understanding their expectations and securing their commitment; and ensuring their long-term participation and contributions to the ICM initiatives.

Several developing countries in the region have been implementing ICM programs for more than a decade (Table 1). In their respective ICM programs, community and other stakeholder participation has been mainstreamed so that their voices and concerns are considered in planning and decisionmaking.

The concept and operational methodologies of the ICM system are examined to identify the methods and techniques used in securing the cooperation of the civil society groups, and how they can serve as valuable partners in advancing the visions of each ICM site. Also examined are various community-based GEF small grant projects, which operate in synergy with the ICM programs to advance the social aspects of local communities. This study further explores how the ICM framework can contribute to enhancing synergies with sectoral initiatives to achieve the wider objectives of sustainable development.

Results

Get buy-in from civil society groups

ICM provides a window for the direct participation of local CBO in projects that benefit the local

Table 1. ICM sites in the EAS region covered in this study.

Country	ICM site/year established
Cambodia	Preah Sihanouk (2000)
Indonesia	Bali (2000), Sukabumi Regency (2003)
Philippines	Batangas (1994), Bataan (2000), Cavite (2004), Guimaras (2008)
Thailand	Chonburi (2001)
Viet Nam	Da Nang City (2000)

environment. During the initiating stage of ICM, dialogues are undertaken among different sectors and stakeholder groups within the community to identify the issues, challenges, and conflicts that directly and indirectly affect the management and use of coastal and marine resources. It is during these early interactions that relationships are built, while providing ICM managers with insights into when and how local people and public and private sector organizations interrelate on different issues, who are the leaders and potential champions, and where and why opposition to change may be expected.

Various participatory approaches and tools are then employed to engage the stakeholders including civil society groups, as appropriate, in the ICM process from baseline assessment to strategic planning, program implementation, and monitoring and evaluation.

The Province of Batangas, Philippines, provides a good example of a local government engaging different civil society groups in the development and implementation of an ICM program. The province has successfully engaged international NGO, fishers' organizations, youth groups, divers' organizations and the business community, to name a few, in its ICM program for the past 20 years (Figure 1). The partnerships have resulted in the scaling up of ICM initiatives from just one bay to the entire coastline of the province.

Figure 1. Participants from stakeholder groups during a meeting on ICM in Batangas Province.



Tap external support

The GEF Small Grants Programme is key catalyst for engaging CBO, NGO, and people's organizations (PO) in the implementation of ICM action programs. The programme makes grants directly available to CBO and NGO for local projects that contribute to sustainable development of their communities. At the same time, these grants provide hands-on experience for community and civil society organizations, to develop their capacities, knowledge and understanding.

In collaboration with local governments implementing ICM programs, PEMSEA provides technical advice and assistance to civil society groups to develop project proposals for submission to the National Steering Committees for the Small Grants Programmes operating in Cambodia, Indonesia, Lao PDR, Philippines, Thailand, Timor Leste, and Viet Nam. These projects have directly contributed to the objectives and targets identified

in coastal strategies/sustainable development plans adopted by the local governments, for example:

- mangrove replanting programs in Preah Sihanouk (Cambodia); Bataan, Cavite, and Guimaras (Philippines); and Chonburi (Thailand) (GEF SGP, n.d.-b-d-e-f-i-j-k);
- sustainable management of mud crab stocks in Chonburi (GEF SGP, n.d.-f);
- protection, monitoring, and regulation of local fishing grounds and fish sanctuaries in Preah Sihanouk, Batangas, Bataan, and Cavite (GEF SGP, n.d.-b-d-g-i-j-k);
- alternative livelihood programs in Preah Sihanouk (GEF SGP, n.d.-i-j-k); Batangas, Bataan, Cavite, and Guimaras (GEF SGP, n.d.-b-d-e-g; Anak Balayan, 2009);
- microfinancing and savings programs for women's organizations in Preah Sihanouk (GEF SGP, n.d.-k);
- community-based waste management through waste reduction, segregation, recycling, and composting in Guimaras and Chonburi (GEF SGP, n.d.-a-e-f-h); and
- urban tree planting in Danang (Viet Nam) (GEF SGP, n.d.-c).

Find the right civil society group

Sustainable fisheries, coastal tourism, and improved waste management are the three main challenges identified in the coastal strategy implementation plan of Preah Sihanouk, Cambodia. Fisheries deterioration, especially in the district of Stung Hav, was a result of a combination of socioeconomic problems, poverty, and the entry of trawl fishers into community fishing grounds, which resulted in competing uses of dwindling resources. It was therefore necessary to develop an approach to address the different root causes of overexploitation of fishery resources.

To address the problem, the ICM Project Management Office in Preah Sihanouk supported the Fishery Community, a CBO composed of fishers in Stung Hav, to develop a project proposal for submission to the GEF Small Grants Programme. The project was initiated in 2006 with the following components: protection of community fishing grounds, rehabilitation and protection of mangrove areas and an existing freshwater reservoir, and improvement of community livelihoods (Figure 2).

On the issue of protecting community fishing grounds, the American Friends Service Committee (AFSC), a local NGO, was tapped to lead a dialogue between

encroachers (fishers from other communities catching fish in other communities' fishing grounds), in this case mostly from Sre Ambel, and from Stung Hav. This began an empowerment process, which led to agreements among groups to protect each community's coastal and marine resources. Both communities agreed on a common measure to discourage entry of trawl fishers into community fishing grounds.

The AFSC was an effective contributor to this process, having prior experience organizing fishers' groups in neighboring communities. It also had personnel in the locality with the capability to bring the conflicting sides together for dialogue.

Partner government and civil society organizations

The project of Stung Hav district, with its various targets in support of sustainable fisheries, provided the framework for a number of organizations to work together including the Fishery Action Coalition Team, Star Kampuchea, and the Sihanoukville Fishery Administration. Each had a particular advantage to mobilize action among members of the community.

The Fishery Administration, a government agency, took on the challenge of addressing the dwindling fish catch and preventing the entry of illegal trawl fishers into the community fishing grounds. To tackle the challenge, the Fishery Administration helped the communities to map out potential *refugia* (no-take zones) near the fishing boundary and to monitor the entry of illegal fishers into community fishing grounds. Artificial reefs (molded concrete blocks) were deployed near the boundaries to deter trawlers from entering as their nets would get caught and ripped by the blocks. The blocks also served as artificial reefs and provided spawning grounds for fishes.

The Fishery Administration provided technical inputs in the execution of this component of the project. Being a government agency, it had the

Figure 2. Stakeholders in Preah Sihanouk (Cambodia) mobilized for mangrove reforestation in Stung Hav.



unique capacity to define boundaries and its staff knew the technology to help replenish fish stocks and deter trawlers. It also had the capacity to support training and enforce policing measures.

Just months after the installation of artificial reefs, community members attested to the significant increase in fish catch in the surrounding areas. An evaluation by the Small Grants Programme indicated a 7-10 kg increase (25-30%) in catch among small-scale fishers. Regular patrolling operations, composed of organized local fishers, were done to complement the installation of the artificial reefs. Some 33 volunteers took turns in patrolling the area to ensure that large-scale fishing vessels stayed beyond the district's fishing grounds and to monitor illegal fishing activities (Rafael, et al., 2010).

In Sukabumi Regency, West Java, Indonesia, the local government works with several civil society organizations. These include Tim Pelestarian dan Penataan Pesisir Teluk Palabuhanratu (TP3TP) or Conservation and Planning Team for the Palabuhanratu Bay and various community groups focusing on mangrove conservation, turtle conservation, ecotourism, urban greening, beach safety, and waste management. TP3TP, established in 2002, is an NGO composed of representatives from the private sector, academe, and communities. It serves as a stakeholders' consultation forum for sustainable development of the bay. Community empowerment and engagement are facilitated in Sukabumi through various community groups including the Kelompok Masyarakat Konservasi (POKMASI) or Community Conservation Group and the Kelompok Masyarakat Pengawas (POKMASWAS) or Community Surveillance Group. Members of these groups are trained by the local government on various environmental protection and resource conservation techniques, and provided support for organizational development and the establishment of community facilities until they are able to sustain the operations on their own.

Address the three pillars of sustainability

Engagement of government agencies and civil society groups as partners in ICM implementation leads to innovative approaches that have cross-cutting social, economic, and environmental benefits to coastal communities. In Bali Province, Indonesia, for example, a group of fishers involved in coral mining were engaged under the ICM program in coral conservation and restoration. With sustained awareness and training activities supported by local and provincial governments, local universities, NGOs, and the Small Grants Programme, the fishers were converted from being coral miners to leaders in coral reef conservation in their area. At present, they are operating an ecotourism program in partnership with private tour agencies, providing tourists with hands-on experience in coral conservation and releasing key species, such as sea turtles, to the sea.

In Chonburi Province, Thailand, fishers' associations were engaged in mud crab conservation, women's groups were employed in waste segregation and recycling, while youth groups were trained to serve as volunteers for mangrove rehabilitation, waste segregation and recycling, water quality monitoring and ecotour guiding (Figure 3).

In Preah Sihanouk, Cambodia, a microcredit facility with a savings and lending components was introduced to create supplemental income and capital to help families meet their basic needs. The savings group was composed of 142 members, 92 of whom were women. Fourteen savings groups were formed and each group was provided with a US\$ 200 startup fund. Members took turns to borrow from the fund depending on their savings. Aside from increasing savings of members from 3,000 riel (US\$0.74) per month at the initiation of the project, to 10,000 riel (US\$2.50) per month in 2008, the credit facility enabled families to sell their products at more competitive prices outside the community. This reduced the role of middle persons, traders lending money in exchange for fish, and provided the families with opportunities to improve household income and increase savings (Rafael, et al., 2010; Figure 4).

Figure 3. Members of the community in Chonburi Province undertaking waste segregation and recycling (top) and mangrove rehabilitation (bottom).



In Bataan, Cavite, and Guimaras, Philippines, improvement of existing fish sanctuaries and ecotourism parks in partnership with local people's organizations covered organizational and technical capacity building of the groups on mangrove reforestation, management, regulation, patrolling and monitoring of the protected areas, waste management, as well as alternative livelihood development (GEF SGP, n.d.-b-d-e).

Invest in institutional strengthening and sustainability

Mechanisms should be established for continued participation of civil society groups as partners of local governments in coastal and marine conservation to enable them to evolve from being passive recipients of projects to being project implementers and leaders. This would include supporting their organizational strengthening and capacity building, recognizing their contributions, and facilitating support to address their concerns and advocacies.

In Batangas Province, Philippines, the *Bantay Dagat* (i.e., Sea Patrol) started as fisherfolk volunteers to support monitoring and surveillance of community-based marine protected areas. *Bantay Dagat* groups from various municipalities were eventually

Figure 4. Establishment of a microcredit facility (left) and development of alternative livelihood for communities(right) in Preah Sihanouk.



organized into a network and institutionalized into the government structure as partners of the provincial and municipal governments and law enforcement units responsible for surveillance of the Verde Island Passage Marine Corridor. They were deputized, provided with law enforcement authority, trained on law enforcement and logistics support (communications equipment, boats, etc.). They were also given benefits and incentives, including health and accident insurance packages by the local government in collaboration with private sector partners.

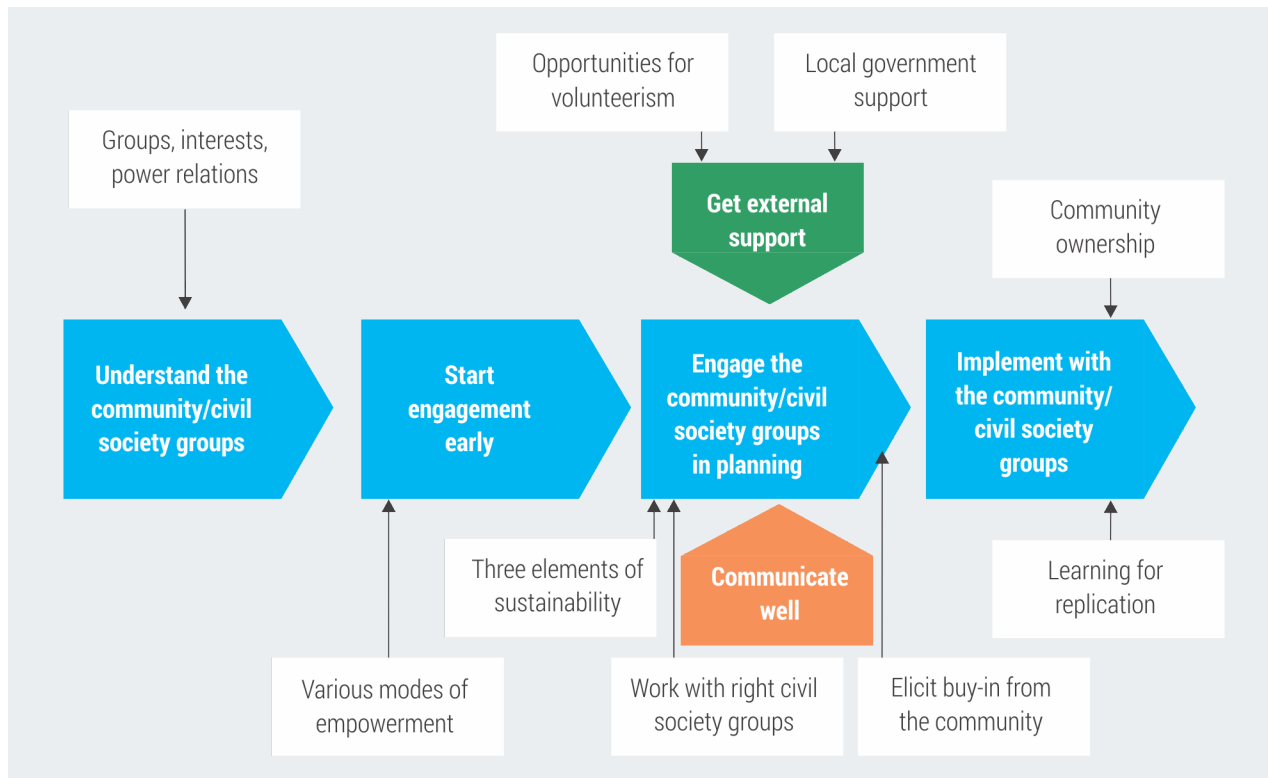
The process and approaches employed by selected local governments in the EAS region in engaging and empowering civil society groups as partners in ICM program development and implementation are summarized in Figure 5.

Outcomes

Enhanced ownership and sustainability. The projects presented above were implemented as part of ICM programs. They highlight how engaging civil society and peoples’ organizations enabled local governments to better respond to the challenges and priorities of coastal communities, particularly the poor. By initiating and developing relationships with the civil society groups, the local governments can transition these groups from potential project beneficiaries, or even project adversaries, into organizations that lead and implement project interventions, which continued beyond the projects themselves.

Empowerment of people and communities. Participation of civil society groups facilitates two-

Figure 5. Process of building capacities and partnerships with civil society.



way communication of interests and concerns between the government and communities, leading to the identification of issues and priorities that are important to communities in general, and to underprivileged and needy sectors of communities in particular. ICM is rooted in the belief that sustainable development of marine and coastal areas can best be addressed through actions that are designed, implemented, and owned by the concerned local government, sectors, and communities, and with benefits such as enhanced food security, increase in household incomes, and sustainable livelihoods that directly accrue to them. For example, the microfinance facility of the ICM program in Stung Hav served as social insurance for its 92 women members. The access to credit in a shorter time period, without restrictive requirements like land titles and other assets as collateral, increased the participation of women in alternative livelihood initiatives at home and in the community.

Engagement of civil society groups in ICM programs can lead to innovations in addressing poverty and the relentless reliance on natural resources extraction by the communities. While the connection looks far removed, this is actually one of the most important interventions. Mr. Prak Visal, a team member that initiated ICM in Preah Sihanouk said: “In areas like this, how can you even start discussing marine and coastal governance if the families don’t even know where to get their next meal?”

Replication and policy change. Over time, partnerships with civil society groups yield networks that enable improved natural resource management, capacity development, knowledge exchange, policy advocacy, and sustainability of ICM and related initiatives. These networks expand ICM’s reach, involving greater numbers of organizations and communities, and lead to greater impacts through scaling up, replication, and policy change. The experiences of the various

ICM projects validate the benefits of engaging civil society groups in ICM, such as the following:

- Their participation ensures that their interests and concerns are articulated and evaluated during strategic planning and the preparation of interventions;
- It enables project proponents to better understand the problems and needs of communities that can contribute to better planned interventions, ownership, and sustainability;
- It increases access to knowledge, resources, or skills of civil society groups that can serve the objectives of the project; and
- Their involvement creates greater opportunity to lobby local and national government agencies to play an active role in scaling up and replicating ICM initiatives beyond the original project.

Lessons Learned

Key lessons learned from the engagement of civil society groups in ICM program development and implementation include:

1. **Engaging groups, who are in close proximity to local problems, is key.** Participation of civil society groups in every stage of the ICM project cycle is important. Direct users and beneficiaries of coastal and marine resources oftentimes have a deeper and broader understanding of local conditions and have a keener sense of strategies that are responsive to local issues (Christie, et al., 2000 in FAO, 2007);
2. **Social groups are a source of social and financial capitals.** Civil society organizations represent both formal and informal sectors. Experience at existing ICM sites in the region has shown that the participation by a broad spectrum of social groups ensures access to a wealth of skills and expertise, experiences, social

and financial capital, and other factors that can contribute to project implementation and achievement of goals;

3. Socio-cultural diversity enhances governance.

Each civil society group may have a specific local focus, but their collective engagement gives credence to issues at the macrolevel. This engagement enriches the plurality of experiences that provides direction to addressing cross-cutting issues and providing lessons to other communities confronting similar challenges;

4. Partnerships must be inclusive. The capacity of civil society to broaden participation also ensures contribution of unique groups, like the youth sector, who are not traditionally included in environmental programming;

5. Sustainability is anchored in buy-in and volunteerism. Civil society groups embody values such as volunteerism and civic action. In many cases, the sustainability of projects and programs is anchored on the sense of ownership of projects. The sense of trust, collaboration, and ownership is developed as the resource users are engaged in implementing management strategies (Christie and White, 1997 in FAO, 2007). In the case of Sihanoukville, mobilizing the fishers to conduct patrolling and mangrove rehabilitation enhanced their sense of having a stake in the project. Volunteerism hinges on a strong sense of belief and conviction that it is the right thing to do, not only for one's family but for the community, which can be fostered in areas where livelihood is closely linked to their environment and people can easily relate environmental degradation to socioeconomic deterioration; and

6. Capacity building empowers. The likelihood of project sustainability is increased as civil society groups are engaged (Court, et al., 2006). The experiences in the ICM sites indicate that, with

the necessary training and guidance, civil society groups can build on the achievements of projects not only to sustain but to develop, scale up, and replicate initiatives at new sites.

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Expanding Green Spaces for a Healthier City: Pilot Model of Urban Greening in Da Nang City, Viet Nam

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Key Message

- The presence of high-quality green spaces in urban areas provides additional environmental and economic benefits including cleaner air and water, more attractive properties and recreational areas, and reduction of erosion and other hazards associated with typhoons and severe storm events.
- By conducting the planning and development processes of greening the city within the context of the broader framework of integrated coastal management as well as promoting best practice, Da Nang City is ensuring that nature and natural processes are employed to support a sustainable, resilient, and environmental city, in which green space is safeguarded.

Abstract

The expansion of urban spaces has generated considerable economic benefits for Da Nang City, Viet Nam. However, rapid urbanization has its downside. The green areas of the city were reduced, leading to a series of socioeconomic and environmental impacts, including loss of landscape, more energy consumption, and increased vulnerability to typhoons.

An urban greening project demonstrated a number of early benefits in Da Nang, including:

- improvement in the landscape and the aesthetic appeal of the city providing more areas for relaxation and recreation for the residents;

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- enhanced volunteerism of the various sectors of the community, including industry, in urban tree planting;
- improved technical capacity of responsible agencies in urban greening; and
- broadening of ecological awareness among the citizens of Da Nang.

Ultimately, as Da Nang becomes greener, it will create a more attractive place for people to live, work, and invest in, which in turn will enhance the potential for job creation, inward investment, and economic growth.

Background

The GDP growth rate of Da Nang for the period 2002-2012 was 12.53% making it one of the fastest growing cities in Viet Nam. Urbanization and industrialization over the past decade decreased the land use area for forestry and agriculture. Natural disasters that struck Da Nang also caused destruction and uprooting of trees and vegetation, and aggravated soil erosion.

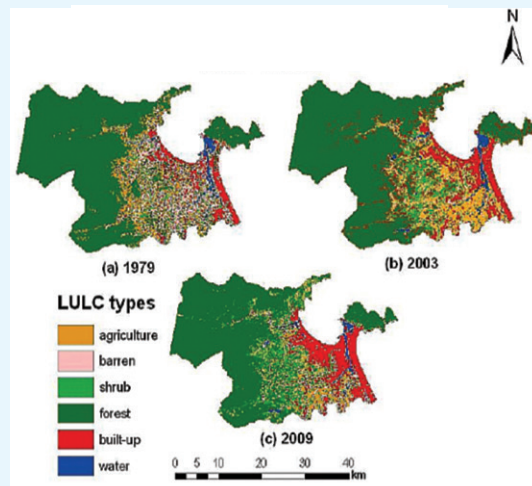
To address the above issues and in line with the long-term vision of the city for sustainable development (Box 1 and Figure 1), Da Nang implemented various programs to protect the environment while allowing industrialization and modernization to proceed:

- raising public awareness and responsibility for environmental protection;
- implementing environmental protection programs in the industrial sector, and urban and rural areas;
- protecting natural resources and landscape, and conserving biodiversity;
- improving environmental management policies and mechanisms; and
- promoting scientific research and technology transfer, and human resources training on environmental protection.

Box 1. Vision – Da Nang Coastal Strategy

“A coastal area of rapid and diversified development, with green, clean, beautiful environment; where the natural resource system is under long-term planning and sustainable use; where the ecological, cultural, and historical values are preserved; where the Da Nang people are provided with maximum benefits while the ecological values are maintained; and where Da Nang shall spearhead Viet Nam and the Region towards sustainable development.”

Figure 1. Land use/cover map of Da Nang City, 1979–2009 (Linh, et al., 2012).



The Master Plan on Socioeconomic Development of Da Nang City Towards 2020 calls for the expansion of the urban green space, which requires planting of trees and other plants in parks, sidewalks, schoolyards, and playgrounds, including residential areas and industrial parks. The city targets expanding its green spaces to cover 9-10 m²/person by 2020.

The identified green space target is designed to achieve the long-term vision of Da Nang as embodied in the ICM Coastal Strategy, which was approved on 26 December 2001 by the People's Committee. It also supports the transformation of Da Nang into an environmental city by 2020.

Approach and Methodology

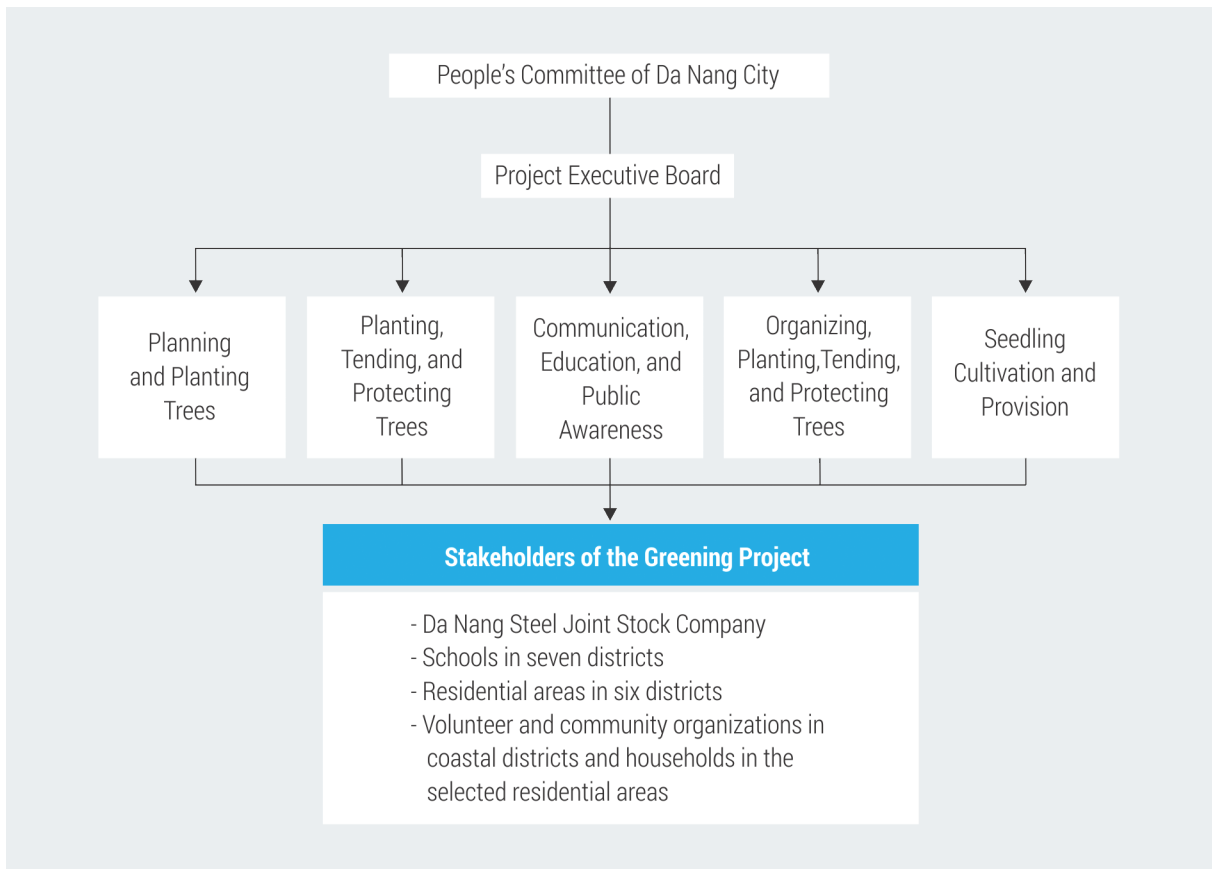
As part of its ICM program, Da Nang implemented a project on Building a Pilot Model of Urban Greening (2007-2009). With financial support from the Global Environment Facility (GEF)-United Nations Development Programme (UNDP) Small Grants Programme (SGP) and in cooperation with PEMSEA, the demonstration aimed to establish a working model for planting, tending, and protecting trees to increase urban greenery, and raising awareness and technical competence of responsible agencies and the local communities with close reference to land use and landscaping of the entire city (Nowak, et al., 1996; Linh, et al., 2012). The following key steps were employed:

Build “greening the city” into the local bureaucracy. Greening a city involves the cooperation and collaboration among different

sectors. In Da Nang, leaders from all governmental levels (i.e., city, district, and commune) fully supported the project, especially in mobilizing people to actively participate in project activities. A Project Executive Board was set up, composed of representatives from the Department of Natural Resources and Environment, Department of Construction, and the Association of Nature and Environmental Protection. The board was responsible for developing the urban greening plan and overseeing its implementation. Under the board, five multisectoral technical units were operationalized (Figure 2), namely:

1. Planning and Planting Trees: comprising experts from the Department of Construction. The unit was responsible for planning and organizing the locations for planting, choosing

Figure 2. Organizational chart of the Greening Project.



the types of plants suitable for each place, and ensuring that the development of the area meets the targets of 4 m² green area/person and 9-10 m² green area/person for 2015 and 2020, respectively.

2. **Planting, Tending, and Protecting Trees:** consisted of experts from the Association of Nature and Environment Protection, Department of Agriculture and Rural Development, and Tree Company. The unit was responsible for training and providing guidance in the application of technologies on planting, caring of, and protecting trees.
3. **Communication, Education, and Public Awareness:** conducted training on the role and benefits of urban greening and sanitation, raising public awareness on planting, caring, and protecting trees.
4. **Organizing, Planting, Tending, and Protecting Trees:** developed the urban greening plan and ensured that the technical requirements were met when providing guidance in the application of techniques of planting, providing seedlings to organizations and community groups through contracts and agreements, and in conducting monitoring and evaluation of the results.
5. **Seedling Cultivation and Provision:** consisted of the Da Nang Tree Company and agro-forestry households that were tending seedling gardens. This unit was responsible for providing various kinds of seedlings and ensuring their quality.

Select appropriate locations and tree species. Trees bring a number of benefits to the urban landscape, and improve the quality of life of those who come into contact with them as part of their daily lives. However, inappropriately sited trees, together with poor species selection, can lead to incompatibility that may result in the trees' removal.

In Da Nang, selected locations include major streets in six districts, schools in seven districts, residential areas in six districts, coastal road, and industrial park (Figure 3). When looking for a site to plant trees, a number of factors needed consideration. Primarily, the site should be able to support a tree throughout its life, with enough space for it to grow without causing nuisance or obstruction. Designs were developed for each location, taking into consideration soil properties, landscape and available trees, existing infrastructure, and suitable tree species. The designs were submitted to relevant agencies (i.e., authorities responsible for streets, schools, residential, roads, and industrial parks) for final review, recommendations, and approval.

Figure 3. Locations for tree planting in Da Nang.



Tree planting along the vicinity of a steel company.



Tree planting in a schoolyard.

Some of the considerations in terms of tree species included:

- Trees selected for the schools:
 - evergreen with broad foliage, long life (over 50 years);
 - column stem, stratification over 3 m tall, without hollow tree trunk disease and without thorns;
 - tough branches, not easily broken;
 - leaves, flowers, and fruit-bearing without poison; and
 - deep tap-roots that do not resurface on the ground.
- Trees selected for the streets, residential areas, and coastal road:
 - large and medium-size with long life span (over 30 years);
 - evergreen tree with large foliage for better cooling effect;
 - branches not easily broken; without hollow tree trunk disease;
 - stems without thorns, flowers, leaves, and fruits that are nontoxic;
 - flowers and fruits do not host insects and pests that are harmful to humans; and
 - adaptable to Da Nang's climate.

Identify and engage the stakeholders. The stakeholders of the Greening Project included workers

from Da Nang Steel Joint Stock Company, school pupils, volunteer and community organizations in coastal districts, and households in selected residential areas. They participated in planting, caring for, and protecting the trees.

The following communication activities were also implemented (Figure 4):

- dissemination of information on tree models and benefits of tree planting;
- dialogue to enhance public consciousness on tree planting and protection;
- introduction of regulations on tree management and banned actions in urban greenery;
- training and transfer of knowledge and techniques on tree planting; and
- dialogue on urban green management.

Implement tree planting, monitoring, and maintenance. The Project Executive Board, in cooperation with stakeholders, oversaw the implementation of the urban greening plan that spelled out the duties of the parties involved; time and place of execution; preparation of equipment and seedlings; and other necessary logistics.

The board was responsible for providing trees, fertilizers, and technical assistance, while the schools and related parties were responsible for planting in accordance with technical procedures.

Figure 4. Training for residents on planting, tending and protecting trees.



The stakeholders involved consisted of pupils and teachers, members of the youth union and women's association, ex-servicemen and workers/gardeners. Pupils in Grades 4 and 5 were assisted in planting by other related stakeholders (Figure 5).

After the completion of planting, the related parties signed commitments to care for and protect the trees in accordance with the procedures provided, making sure that hundred percent of the trees would survive. Tending the trees, which included regular watering, fertilizing, pruning, and preventing disease was assigned to respective units. This type of maintenance was critical for at least the first two or three years while the trees get established. The idea was to foster local "ownership" of the planting such that local people become the important eyes and ears during the establishment phase of the project.

Technical experts of the project were responsible in supervising the planting and tending of the trees at each location, and in detecting violations and recommending solutions to identified problems (Figure 6). The monitoring was conducted randomly at least once a week for each location. The technical experts also measured the height and stem diameter of the trees, and overall tree health. The data were encoded, regularly updated, and analyzed using management software. Quarterly reports on the results and status of the models and tree growth were prepared and submitted to the People's Committee and the project sponsor, GEF-UNDP SGP.

Results

Increased green spaces with anticipated recreational, aesthetic, and ecological benefits. Nowak, et al. (1996) define "urban tree cover" as the proportion of area, when viewed from above, occupied by tree crowns. Aggregating the tree cover in the parks, offices, and schools, the average tree cover in Da Nang reached 2 m²/person during the project. Compared to the standard urban tree cover

Figure 5. School children and communities participate in tree planting activities.



Figure 6. Representatives of stakeholders conduct site selection and consultation on urban greening.



(i.e., 5 m²/person for over 20,000 people), the green cover of Da Nang was still very low.

Through the urban greening project, over 20,000 trees were planted in 23 different locations. Survival rate of planted trees, particularly in schools, was a hundred percent. In the coastal road, two hectares were covered with an estimated 850 coconut trees. Layering of trees in the coastal areas was undertaken to protect the shoreline from strong winds and storm surges.

Enhanced awareness and capacity among the local communities and technical personnel in urban greening. A total of 17 training courses involving more than 3,000 participants were conducted to raise awareness on the current

status of green cover in Da Nang City; ecological importance of urban green spaces; significance of the project; planting management regulations; and more importantly, the role of the community and various sectors in project implementation and management. Training on the technical guidelines on planting, tending, and protecting trees was also conducted.

Community volunteerism and active participation of stakeholders through a well-designed implementation plan. A declaration of commitment to care for and protect trees was signed by the leaders of the communes and schools, including the Da Nang Steel Joint Stock Company.

The local government, related departments, and organizations strongly supported the implementation of the urban greening models. The different stakeholders were mobilized and participated actively.

Although the duration of the project (i.e., three years) is a relatively short time to show significant results, particularly in monitoring the growth and survival of the trees, the initial results provided the impetus for the People's Committee to direct related departments and organizations to develop projects on planting, tending and protecting trees to cover the whole city.

The project also instilled the spirit of volunteerism among the people. Similar activities in the past were fully subsidized by the government. The awareness raising activities contributed significantly in changing the people's mindset.

An efficient management mechanism for urban greening. The urban greening project benefited from the experiences of the ICM program. The project was able to mobilize human resources and materials from districts and communes; related agencies, social organizations, and industries; and

the youth. The participation of the industry, which provided logistical support and financial resources, is an area needing expansion to help sustain the initiative.

Lessons Learned

High-level commitment. The Master Plan on Socioeconomic Development of Da Nang City Towards 2020 was the trigger that set out the objectives for greening the city. The high-level plan ensured efficient coordination among sectors and mainstreaming of action plans that impacted the urban greening initiative.

Practical measures for greening the city. Using a combined approach of interagency consultation, field assessment, and consultations, practical measures to address the main stages of planning and development of a greening program evolved in Da Nang from early site assessment through the detailed design and monitoring stages. The main steps of the process included:

- initiating early consultation between planners and developers;
- conducting field surveys to assess the suitability of sites for tree planting, and the developing and identifying of appropriate green spaces and opportunities at an early stage;
- designing the development in selected areas, with due consideration given to physical and environmental conditions at each location and the appropriate tree species for the identified conditions;
- getting the community to be positively involved by building awareness and encouraging maintenance of the newly planted trees, through volunteerism; and

- monitoring the newly planted areas to ensure the health of the trees and to mitigate any problems or negative impacts associated with the greening program, with a view to continually improving and expanding the program to achieve a minimum urban tree cover target of 5 m²/person.

The Da Nang initiative in developing high-quality green spaces in its urban areas generated long-term socioeconomic and environmental benefits and certainly serves as a working model for other urban cities in the country. The broad ICM framework helped not only in developing a common vision but also in generating collaborative opportunities among agencies, citizens, and national and international donors through the development and implementation of projects and programs such as this one.

Longer-term benefits. The presence of high-quality green spaces in urban areas provides additional environmental and economic benefits including cleaner air and water, more attractive properties and recreational areas, and reduction of erosion

and other hazards associated with typhoons and severe storm events. By conducting the planning and development processes of greening the city within the context of the broader framework of ICM, as well as promoting best practice, Da Nang City ensured that nature and natural processes are employed to help support a sustainable, resilient, and environmental city, in which green space is safeguarded.

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Ecotourism Development in Basyaw Cove (Guimaras, Philippines) by a People's Organization in Cooperation with Development Partners

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Key Message

- A strong, active, and organized coastal community with a clear environmental advocacy and commitment can secure the trust of local governments and partners and optimize their support, as well as facilitate implementation of activities for improving the social, economic, and environmental well-being of the community.

Abstract

Barangay Dolores in Nueva Valencia was one of the richest fishing grounds in the island province of Guimaras. The mangrove forest of Basyaw Cove was able to sustain a healthy supply of marine resources before the 1970s. Traditional fishing was by hook and line, which provided the primary source of income for the fisherfolk.

The conversion of the Basyaw Cove mangrove forest into fishponds and the proliferation of illegal and destructive fishing adversely impacted the island's ecological system. A partnership between various government and donor agencies enabled the successful engagement of the local communities of Guimaras to overcome the challenges of environmental degradation, enabling them also to propose, execute, and manage community-based programs on environmental protection and conservation. One particular people's organization in Nueva Valencia was the *Katilingban sang Magagmay nga Mangingisda sa Dolores* (KAMAMADO), whose involvement in numerous programs to rehabilitate the coastal fishery resources of Barangay Dolores spanned over 15 years. Comprising marginal fishers, it established a track record of successfully implementing

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conservation projects with a variety of partners, creating additional opportunities in the process. It formulated the Basyaw Cove Development Plan (KAMAMADO, 2007), a key component of which was the development of an ecotourism park. The plan fit in well with the country's National Ecotourism Strategy and Action Plan and received support from the local government, private sector and international development agencies.

Background

The island province of Guimaras is the youngest and smallest of the six component provinces of the Philippines' Western Visayas region. Guimaras is composed of five coastal municipalities: Jordan (the provincial capital), Buenavista, Nueva Valencia, Sibunag, and San Lorenzo.

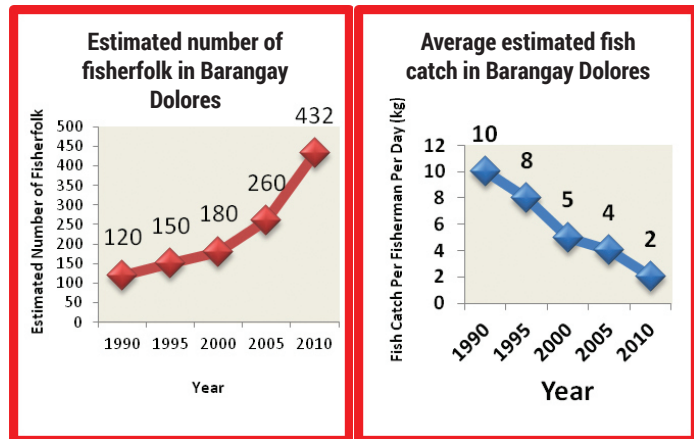
Known as the "mango country", the island has 8,000 ha of mango orchards managed by corporations and individual growers. The province is also endowed with fishing grounds rich in marine biodiversity, and boasts of white sand beaches and diving spots. It has been proclaimed as the "island to watch" due to the huge tourism potential of its pristine natural beauty.

In addition to being home to a variety of wildlife, Basyaw Cove is an excellent mariculture area – including mud-crab fattening and culture of high-value fishes. The natural barriers of small islets, joined by land bridges that are underwater during high tide, protect the cove from strong waves and storm surges.

Basyaw Cove is ecologically significant because of its key marine habitats. It is located beside the 18th-century Guisi Lighthouse, which used to guide Spanish galleons passing the Iloilo Strait.

Yet many people in the coastal communities were living at subsistence levels. A case in point was the

Figure 1. Socioeconomic condition of Dolores, Nueva Valencia, Guimaras.



fisherfolk living in the vicinity of Basyaw Cove in Barangay Dolores (Dolores Village) in the town of Nueva Valencia. Residents complained about the continuing decline in the quantity of their catch from the seas, which is their primary source of livelihood (Figure 1).

The decline in marine resources can be attributed to overfishing, illegal fishing, encroachment by commercial fishing vessels using modern fishing technology, waste contamination from growing human settlements, mangrove destruction by human activities, and a major oil spill. The Philippines' biggest oil spill occurred in 2006 when a tanker carrying two million liters of bunker fuel sank off the coast of Guimaras Island, severely affecting hundreds of hectares of mangroves.

Mangroves were being illegally cut or harvested not only for fuel and charcoal making, but also as a highly favored bonsai gardening material that commanded high market prices. Areas cleared of mangroves were subsequently converted into fishponds, which destroyed the area's ecological balance. It was therefore imperative to protect and preserve the Basyaw Cove mangroves as they serve as nursery grounds for all kinds of fish and shellfish, a primary source of income for 304 households in Barangay Dolores (Box 1).

Box 1. Basyaw Cove biodiversity.

- The mangroves are mostly *Avicennia* and *Rhizophora* totaling 4-5 ha, prevalent inside the Basyaw Cove. In the Baseline Biophysical Survey conducted, mangroves comprised 19 species of true mangroves belonging to four families and six genera.
- The naturally distributed mangrove – and a highly favored bonsai gardening material – *Pemphis acidula* needs protection from overharvesting.
- The mangroves in Basyaw Cove serve as nursery grounds for fishes and shellfishes (13 species of fishes, 8 species of shells, 4 species of crabs, and various sizes and quantities of unidentified shrimp species).
- The inventory of plants and terrestrial fauna identified more than 100 species of plants, 21 species of birds, 2 species of lizards, and 1 mammal species.

“Mangroves are essential to the ecological and socioeconomic health of the area in which they thrive. They serve as barriers to prevent erosion and sediment deposits from the mainland to nearby coral reefs, and from storm surges and high winds. They also play an important role in nutrient cycling and provide habitats to many species such as birds, small fishes, shells and crustaceans.” (PAWB-DENR, 2009)

Approach and Methodology

Engaging local communities in resource management

Various activities related to habitat protection, restoration, and management were incorporated in the work programs of the municipalities, despite the lack of a habitat management plan. Coastal municipalities were implementing programs ranging from establishment of artificial reefs, mangrove reserve zones, coral gardens, rehabilitation of threatened species and habitats, and establishment of mangrove nurseries for reforestation purposes.

In the case of Nueva Valencia, the local government decided to involve local communities as they were key stakeholders. Environmental degradation and ecological imbalance were affecting them most with declining income and they were best suited among the stakeholders to assume the lead role in implementing development projects at the grassroots level. This also ensured that the activities of local communities were aligned with national and provincial socioeconomic and environmental agenda. Of primary consideration was sustainability, driven by strong motivation from a sense of ownership of these projects. The strategy was that communities would fully embrace and actively pursue the ideals of development in their locality but needed external guidance and assistance from the government, donor agencies and NGOs. The advantages of this development mode included a strong sense of ownership, concerted efforts, seamless coordination, and synergistic outputs. Most importantly, a true sense of community at work was needed, which would greatly increase the sustainability of a development program and the likelihood that it would be passed on to the next generation.

One prominent and stable people's organization in Nueva Valencia was KAMAMADO. Comprising marginal fisherfolk, with clear mission and function, it was considered the most active people's organization in the entire Guimaras Province (Box 2).

The KAMAMADO was successful in actively seeking out relevant government agencies to assist and improve their capacity. Officers and members of KAMAMADO continuously participated in conservation and organizational strengthening seminars with assistance from various agencies. KAMAMADO's membership reached 120 at its peak, with 43 listed as active members. Its strong commitment as an organization and capability to successfully undertake programs made it the rational choice for partnership with various agencies.

Box 2. The KAMAMADO experience.

Registered in 1999, the KAMAMADO, translated as organization of small fishers in Dolores, aimed to create a strong and viable organization for the conservation, protection, and rehabilitation of coastal resources that would improve the socioeconomic conditions of small-scale fishers in the area. Specifically, it aspired to: (1) protect, conserve, and rehabilitate coastal and fishery resources, and promote public awareness toward this end; (2) maintain ecological balance of coastal fishing areas; and (3) increase fish production by at least 100% from the present level.



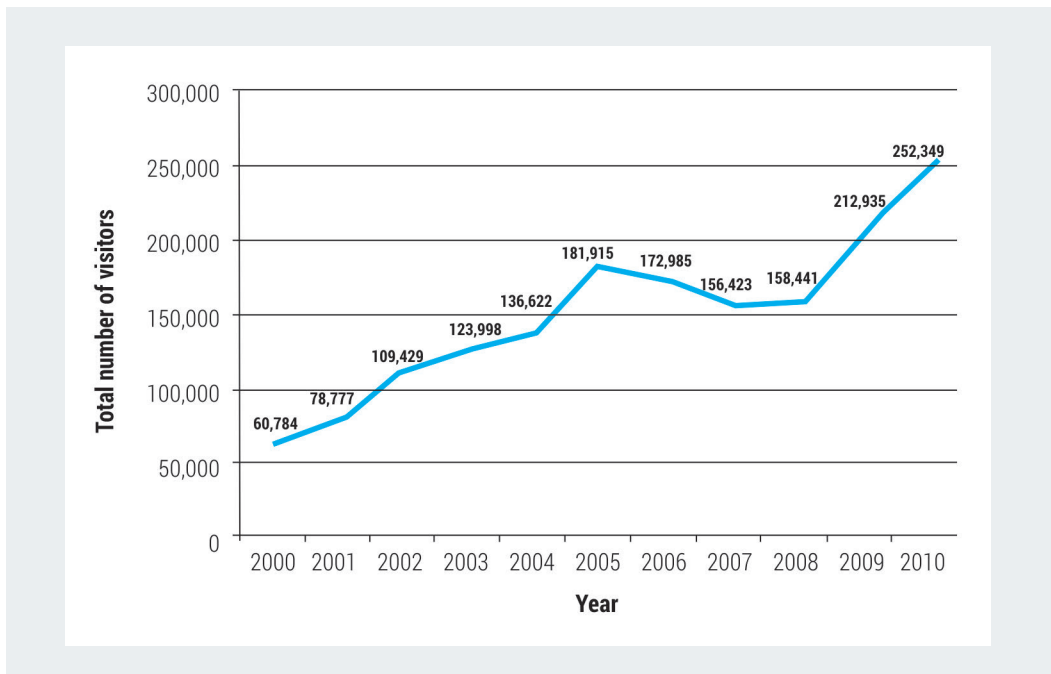
Ecotourism development

According to the Philippine’s National Ecotourism Strategy and Action Plan (NESAP) 2013-2022, the potential market size for ecotourism in the country is between 1.25 million and 14.18 million tourists, and potential maximum earnings could reach PhP157 billion (US\$ 3.7 billion) by 2016 (NESC and ETWG, 2014; Box 3). Tourists visiting Guimaras increased nearly five fold from 2000 to 2010 (Figure 2).

The importance of developing and strengthening partnerships was highlighted in NESAP 2013-2022: “The communities and development partners are the key players in ecotourism development and this strategy aims to facilitate the engagement of partnerships among communities, entrepreneurs, government and funding sources.”

Furthermore, Philippines’ ecotourism development should be based “on the concerted efforts of concerned stakeholders including government, private sector, civil society and the host communities” (NESC and ETWG, 2014). In Guimaras, healthy and strong linkages and cooperation already existed among the

Figure 2. Number of tourists to Guimaras (2000–2010).



provincial government, Nueva Valencia municipal government, donor agencies, NGOs, especially KAMAMADO.

Over the past 15 years, members of KAMAMADO acquired and developed critical skills and capabilities from local experiences and several interagency partnerships. The partnerships in Guimaras for ecotourism, particularly the community-based rural tourism (CBRT), were based on the programs and approaches identified by the province, which involved the people's organizations, NGO, barangay development councils, national government agencies with the assistance of municipal and provincial governments. Each partner played a specific role, e.g., KAMAMADO was in charge of Tour Group Guides for the Guisi Heritage Site CBRT in Barangay Dolores.

Results

Partnerships in conservation

KAMAMADO's commitment and growing capability to implement conservation programs made it the rational choice for partnerships with various agencies. This enabled them to be successful in securing assistance from government agencies at different levels.

The need to protect and conserve Basyaw Cove's water quality was realized in the late 1980s when the local government issued a Fishpond Lease Agreement (FLA) to a private group of individuals, and which resulted in total deforestation of the area. KAMAMADO supported the cause for cancellation of the agreement, ending the long struggle with the agreement reversal in February 2002. Pending the release of the order of finality from the Bureau of Fisheries and Aquatic Resources on the reversal of the FLA, KAMAMADO embarked on a mangrove reforestation project jointly with the provincial government through the Guimaras Environment and Natural Resources Office (GENRO). Taking the

Box 3. Ecotourism and poverty.

"Ecotourism is seen as a means for reducing poverty that will hasten the fulfillment of the UN's Millennium Development goals. The [country's] National Ecotourism Strategy 2013–2022 will not only conserve our biodiversity, it will also help the local communities to have another source of income without going into unsustainable natural resources extraction activities."

– **Former Sec. Ramon Paje**
Department of Environment
and Natural Resources
Philippines

risk that a Community-based Forest Management Agreement (CBFMA) would not be granted, KAMAMADO planted 20,000 seedlings of *Rhizophora mucronata* in 2004 and 2005. This was one of the major conservation efforts in the cove since the petition for reversal of FLA, and it boosted the morale of members (KAMAMADO, n.d.).

The Nueva Valencia municipal government approved the Coastal Fishery Resources Recovery Program (CFRRP) developed by KAMAMADO in 2004, which analyzed the problems and issues in fisheries; developed a workplan and budget; and worked out a partnership arrangement with concerned authorities for co-management of all activities in Basyaw Cove, which formed part of the Municipal Five-Year Coastal Resource Management Plan. This included the establishment of milkfish cage culture as a livelihood project.

To complement CFRRP, KAMAMADO then formulated the Basyaw Cove Development Plan (BCDP) in 2007, highlighting it as an ecotourism park. The BCDP envisioned Barangay Dolores as both a progressive fishing community and a tourist destination with better social environment and ecological balance. The development of the Basyaw Cove as an ecotourism park was expected not only to enhance fish production, but also to generate

alternative sources of income that would improve the quality of life of the people in the surrounding communities.

The project was to be implemented in four phases: (a) acquisition of authority for KAMAMADO to reforest the Basyaw Cove; (b) reforestation of Basyaw Cove; (c) installation and/or introduction of tourism facilities and services; and (d) introduction of livelihood projects such as crab fattening and culture of *talaba* (oyster), *imbaw* (clam) and tilapia. Implementing Phase 2 of BCDP, the reforestation of Basyaw Cove required about 50,000 *bakhaw* (*Rhizophora* mangrove) trees to be planted in a 10-ha area. Thereafter, tourism facilities and services would be installed, including: (a) construction of a bamboo footwalk around the cove, guardhouse, and small boat landing facility; (b) acquisition of boats; (c) conduct of training for tourism-related activities; and (d) installation of water system and lighting facilities.

Aside from mangrove reforestation, KAMAMADO established a coral garden and led the annual *Sibiran Festival*, a community-based tourism event showcasing traditional fishing practices using 'fish-friendly' gear and methods.

Recognizing the danger of resource overexploitation to the ecosystem and the need to strengthen and consolidate efforts in marine and coastal resource management, the province signed an agreement with the Department of Environment and Natural Resources (DENR) and the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) in 2008 for the sustainable development of its marine and coastal environment and resources, through the implementation of integrated coastal management (ICM).

Through the Guimaras ICM Program and PEMSEA, KAMAMADO became a recipient of the Global Environment Facility (GEF) United Nations Development Programme (UNDP) Small

Grants Programme and implemented the Mangrove Rehabilitation and Development of Basyaw Cove project beginning February 2012. The project's various components led to the following outputs (KAMAMADO, 2012): (a) capacity building for effective project and mangrove management; (b) development and conduct of information and education campaigns; (c) mangrove reforestation; (d) ecological solid waste management; (e) enforcement of environmental laws and policies development; and (f) livelihood projects.

The group continued to maintain strong interagency linkages. In partnership with the Zoological Society of London, it implemented the four-year Community-based Mangrove Rehabilitation Program (CMRP) in 2008, aimed at reforesting 6.4 ha of mangroves in Basyaw Cove. The CMRP strategies include active community participation, increasing capabilities of stakeholders, collaboration, and networking (Primavera, et al., 2012).

Capacity development continued with training activities on mangrove conservation and management laws and policies, ecology, project implementation, monitoring and evaluation, management and financial systems, and tour guiding.

At the national government level, DENR issued the CBFMA in 2009 to KAMAMADO for 25 years, renewable for another 25 years. Recognizing KAMAMADO's leadership in mangrove rehabilitation, the Department granted them a CBFM – Comprehensive Agrarian Reform Programme (CARP) Livelihood Development Project in 2012, aimed at expanding mangrove rehabilitation in Basyaw Cove beyond the 6.4-ha CBFM area. This project included milkfish culture in floating cages to generate income for the organization.

The Coastal Resource Management Framework (CRMF) was formulated under the guidance of the DENR-Provincial Environment and Natural Resources Office (PENRO) Guimaras. Proposed

activities for the management and utilization of Basyaw Cove within 25 years were incorporated into the CRMF, which was used by KAMAMADO as a guide in implementing mangrove rehabilitation and the utilization of the cove (KAMAMADO, 2009).

Mangrove cover improved, and KAMAMADO continued with mangrove planting and protection, with personnel assigned to maintain and guard the rehabilitated mangrove. The abundance of marine organisms (fish, shellfish, crustaceans, etc.) increased, resulting in increased fish catch and income for fisherfolk. Beach resorts continued to operate while new ones were built to accommodate increasing numbers of tourists.

The KAMAMADO established an 8 m x 12 m mangrove nursery constructed from lightweight materials, which held 5,000 *Rhizophora* propagules. Seedlings were grown to a minimum height of 1 m before being transplanted and were used for rehabilitating degraded mangroves and replacing transplanted seedlings that have died. This ensured success of mangrove reforestation. The improved mangrove cover increased ecosystem services including biodiversity and ecotourism.

Seventeen hectares of the Basyaw Cove mangrove area were under the Barangay Dolores Marine and Fish Haven, a newly declared 56.5-ha marine protected area in Nueva Valencia, which was established with the assistance of the Zoological Society of London.

KAMAMADO developed the Community Savings Credit Association. In its fourth annual cycle, the system involved purchasing a share in the association for PhP50 (US\$1). Members were able to borrow thrice the amount of the total shares purchased. The loan was payable in three months with 10% interest. A 5% surcharge was imposed when the loan was not paid within three months. After a year, shareholders decided where

and how the allocated budget would be used for development of facilities to support ecotourism. This system provided access to funds for education of children and fishing and other livelihood activities. Other fund sources included the Social Fund (PhP10/week/member) and penalties collected for absence at meetings and tardiness.

Lessons Learned

The case of Basyaw Cove and the active involvement of KAMAMADO was a clear testament of successful partnerships and institutional setup. It showed that a strong, active, and organized coastal community with clear environmental advocacy and commitment can secure the trust and optimize the support of local governments and partners, as well as help facilitate the ground implementation of activities for improving the social, economic, and environmental well-being of coastal communities.

The active participation of local communities is very important. They are affected by environmental degradation as their livelihood depends on the resources. Dwindling resources and declining income are a real threat that will galvanize communities to take action. They are best suited and motivated among the stakeholders to assume the lead role in implementing activities that offer improved sustainability, and having a sense of ownership for the project further ensures long-term involvement.

This case study demonstrated that effective cooperation with government and development partners can be sustained. Active involvement of KAMAMADO was a clear testament to the vital elements of successful partnerships and institutional setup. It showed that a strong, active, and organized coastal community with a clear environmental advocacy and commitment can secure trust of local governments and partners and optimize their support to facilitate on-the-ground

implementation of activities for improvements in the social, economic, and environmental well-being of the community.

Sustained capacity building of KAMAMADO members helped to ensure the successful development of ecotourism. Training and exposure visits increased their capacity in project management and enhanced the strong linkages with government agencies (local and national), funding institutions, and NGO. The members became fully aware and responsive to environmental concerns related to coastal resources management (CRM). Despite meager funds, their collaborative (*bayanihan*) spirit resulted in continued construction of facilities to support Basyaw Cove as an ecotourism site. Through their institutionalized law enforcement activities for environmental protection and financial savings mobilization system, they were able to improve their socioeconomic conditions, including sending their children to college.

KAMAMADO's capacity in sustaining its efforts in CRM, enhancing ecotourism development, and continued collaboration with other stakeholders helped the local and provincial governments to develop Guimaras as an ecotourism destination.

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Enhancing Accountability in Environmental Governance through the State of the Coasts Reporting System

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Key Message

- The State of the Coasts (SOC) Reporting System enhances accountability in the environmental governance of coastal areas through systematic and comprehensive monitoring of ecological and social outcomes of management actions on environmental and social sustainability.

Abstract

Monitoring, evaluation (M&E) and reporting are integral components of integrated coastal management (ICM) implementation. Local governments in the East Asian Seas (EAS) region implement varying M&E and reporting systems, and with different indicators and parameters being used. This makes it difficult to assess progress across sites and their collective contribution to sustainable development of coastal and marine areas.

PEMSEA developed the SOC reporting system to operationalize M&E and reporting in the ICM sites. The SOC evaluated 35 core indicators covering governance elements and sustainable development aspects. The SOC was developed through a stage-wise, multisectoral, and consultative process. It is applied at the *Initiating Stage* of the ICM cycle in order to arrive at a comprehensive assessment of the baseline conditions of the area. From this baseline, progress can be evaluated in the course of ICM implementation.

This case study presents the results of SOC applications in Batangas and Guimaras, Philippines, and Preah Sihanouk Province, Cambodia and how the SOC triggered management actions. The case study also illustrates how SOC provided the platform to interact and gather input from the different sectors and stakeholders providing a comprehensive assessment of the issues from different perspectives.

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The SOC is an evolving tool and it is anticipated that as ICM sites gain more experience in program implementation, SOC will be expanded to provide the means for in-depth understanding of the progress and impacts of ICM implementation.

Background

M&E and reporting are integral parts of ICM implementation. A management program can only be improved if its implementation can be measured and evaluated. In many coastal management programs, however, this is often the weakest part of implementation and it is very common that accomplishments of activities are reported fragmentally and not evaluated against a set of measurable targets.

Reporting as in the case of preparing environmental profiles and progress reports is impeded by the lack of an integrated M&E and reporting tool that was specifically intended for local governments implementing ICM programs.

As such, local governments implementing ICM programs across the EAS region were using different parameters, indicators, timeframes, and processes for monitoring and reporting progress and achievements. This made it difficult to consistently assess progress at each ICM site, and across the various sites as well as their collective contribution to sustainable development of coastal and marine areas.

Data availability, accessibility, and accuracy were some of the challenges encountered. Data were usually not being collected, stored, or analyzed in a systematic manner, constraining analysis of the trends and changes occurring in the area under ICM implementation.

With such premise, PEMSEA developed the SOC reporting system as an operational tool for local government's use in monitoring the progress and impacts of ICM programs. The SOC was also developed to serve as a scorecard for local governments to track their progress towards local, national, and international sustainable development targets.

SOC also facilitates M&E of the different stages of ICM implementation. At the start of an ICM program, the SOC provides a framework for collecting and collating baseline information on the socioeconomic, biophysical, and ecological situations within the ICM site, as well as legal and institutional mechanisms, and ongoing programs of the local government. The baseline information provides managers with a good indication of the issues, challenges, and gaps in coastal management, along with a sense of who the key players are and what they are doing. At the completion of the ICM cycle, SOC can provide information for the refinement of ICM program, including priority issues that will be addressed in the next ICM cycle.¹

Approach and Methodology

Uniqueness of the SOC reporting system

Compared to other reporting tools and environmental profiling approaches, the uniqueness of SOC is that it gives a comprehensive account of the current status of the area in relation to PEMSEA's integrated management framework for sustainable development of coastal areas.² The SOC structure aligns with the management framework thereby providing a more complete picture of the socioeconomic and ecological conditions of the area and facilitating the evaluation of the combined impacts of governance and management measures of the ICM system.

¹ For further information, see *Bonga and Chua (this volume)* and *Padayao and Gervacio (this volume)*.

² For further discussion, see *Bonga and Chua (this volume)*.

The SOC takes into account existing policy, legislative, and institutional mechanisms and processes that are in place prior to the ICM program; and evaluates what has been changed and/or strengthened as a result of ICM program implementation. SOC further considers existing priorities of the local government for sustainable development of the coastal area and the coverage, progress made, and adequacy of governance mechanisms and management interventions. Thus, over the course of the ICM program, SOC can be used as a tool to assess progress, changes and impacts (i.e., socioeconomic and ecological) as well as to identify gaps and weakness in governance and management processes that need further attention.

The SOC tries to gather data from different years in order to identify changes or trends that have occurred. This provides the basis for recommendation(s) on how the government and concerned stakeholders should respond to the identified changes.

Common framework for M&E and reporting in ICM Sites

The SOC prescribes the use of 35 core indicators covering the six elements of governance (i.e., policy, strategies, and plans; institutional arrangement; legislation; information and public awareness; capacity development; and financing mechanisms) and five issue-specific management programs (natural and human-made hazard prevention and management; habitat protection, restoration, and management; water use and supply management; food security and livelihood management; and pollution reduction and waste management).

The SOC uses simple, meaningful, and measurable indicators that complement those of relevant regional and international instruments including

the World Summit on Sustainable Development (WSSD) Plan of Action, the Millennium Development Goals (MDG), Agenda 21, United Nations Framework Convention on Climate Change, Hyogo Framework of Action, Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), etc. The indicators were determined from a matrix of commonly measured indicators validated for their applicability in the region through pilot-testing in Batangas Province and based on a series of discussions and workshops with regional and international experts on environmental assessments.

From a total of 160 indicators that were initially identified, 35 core indicators were selected to measure the outcomes of specific management measures addressing essential social, economic and environmental concerns. Over time, as more experience is gained, additional indicators could be included in the SOC reporting system as local governments proceed through successive ICM cycles.

Developing the SOC in the ICM program

The SOC operationalizes the M&E and reporting component of ICM program implementation. It is important that the SOC is developed at the initiating stage of the ICM cycle so that relevant socioeconomic, biophysical, ecological, existing management programs and implementing mechanisms can be gathered and serve as basis for identifying the priority issues, challenges, and gaps. During ICM program implementation, as data become available, the SOC can be updated. The updating of the SOC can be ideally coincided with the planning cycle of the local government (e.g., 3-5 years) so that the results and recommendations from the SOC can be considered in local government development planning.

The development of the SOC report follows a stage-wise process as outlined in the Guidebook on the State of the Coasts Reporting (PEMSEA, 2011). The guidebook includes an SOC reporting template to guide local governments in gathering the required data. The three major stages in preparing the SOC report are indicated in Figure 1.

Given the coverage of the SOC and the broad range of data required, the involvement of the different sectors is important to facilitate its development and implementation. No single agency has all the necessary data needed for a comprehensive and integrated assessment of an area. The involvement of the relevant sectors in the SOC development and implementation process promotes integrated data gathering and sharing, as well as ownership of the report. The establishment of a multisectoral Technical Working Group (TWG) at the initiation of the SOC development should be considered. The office/agency coordinating the implementation of ICM should work closely with the TWG during the SOC development process.

Results

SOC implementation in the EAS region

ICM sites across the EAS region are at varying levels of implementing the SOC reporting system (Table 1). SOC reports for most ICM sites applied the 35 core indicators indicated in the SOC Guidebook (PEMSEA, 2011). The SOC development process was led by a multisectoral TWG and involved a series of multistakeholder consultations, validation, and consensus-building activities. In PR China and Singapore, some indicators were not used in the SOC preparation due to their inapplicability in the two areas.

Figure 1. General steps in SOC development and implementation.



Table 1. SOC development and implementation in the EAS region

Sites	Process	Indicators	Status of SOC development and implementation
Batangas, Philippines	Led by multisectoral TWG; consultative process	35 core indicators	SOC report published (PG-Batangas and PEMSEA, 2008); initiated the process of SOC updating
Guimaras, Philippines	Led by multisectoral TWG; consultative process	35 core indicators	SOC report published (PG-Guimaras and PEMSEA, 2012)
Preah Sihanouk, Cambodia	Led by multisectoral TWG; consultative process	35 core indicators	SOC report in Khmer adopted by the ICM Council as basis for planning and management (PG-Preah Sihanouk and PEMSEA, n.d.)
Masan Bay, RO Korea	Led by multisectoral TWG; consultative process	35 core indicators	SOC report published (Lee, et al., 2012)
Da Nang, Viet Nam	Led by multisectoral TWG; consultative process	35 core indicators	SOC report in Vietnamese adopted by the Danang People's Committee as basis for planning and management
Xiamen, PR China	Led by partner academe; consultative process	35 core indicators	Report drafted; available in Chinese and English
Dongying*, PR China	Led by national experts and national task forces; consultative process	32 with slight modifications of indicators	SOC report published (OFB of Dongying Municipality, 2010)
Chonburi, Thailand	Led by multisectoral TWG; consultative process	35 core indicators	Report drafted
Liquica and Manatuto Districts, Timor-Leste	Led by multisectoral TWG; consultative process	35 core indicators	Reports drafted
Parallel sites in PR China*: Panjin, Laoting, Qingdao, Liayuangang, Quanzhou, Yangjiang, Haikou, and Fangchenggang	Led by national experts and national task forces; consultative process	27 core indicators; 5 auxiliary indicators	Reports drafted; available in Chinese
Bataan and Cavite, Philippines	Led by multisectoral TWG; consultative process	35 core indicators	SOC reports published (PEMSEA and PG-Bataan, 2017; PEMSEA and PG-Cavite, 2017)
Pampanga, Philippines	Led by multisectoral TWG; consultative process	35 core indicators	Data gathering stage
Singapore	Led by team of experts; consultative process	17 core indicators**	SOC development initiated
Sukabumi, Indonesia	Led by multisectoral TWG; consultative process	35 core indicators	SOC development initiated

* The indicator system for PR China was recommended by the State Oceanic Administration after the reviews undertaken by national experts and national task forces. Indicators that were not applied in the SOC process were viewed as not applicable to the sites.

** Identified by responsible national agencies as relevant to Singapore.

SOC triggers action and promotes environmental accountability

The SOC report, as a whole, is a technical resource document that is intended for planners and managers in coastal and marine management. The summary table of indicator results in the form of “faces” attempts to promote easy understanding and use of the assessment by local chief executives (LCE) and general public (Tables 2, 3, and 4).

Providing at-a-glance status of the area relative to the different indicators, the SOC aims to catch the attention of LCE on issues that need further attention in the local government’s ICM program. The “faces”³ summarize the trends and results for each of the SOC indicators and requirements for management actions. The “faces” promote environmental accountability in the sense that “something gets corrected when needed and where warranted” as indicated by the frowning faces.

The cases of Batangas and Guimaras, Philippines, and Preah Sihanouk Province, Cambodia, illustrate how the SOC reports promoted environmental accountability and triggered planning and management actions by the local governments.

The case of Batangas Province, Philippines

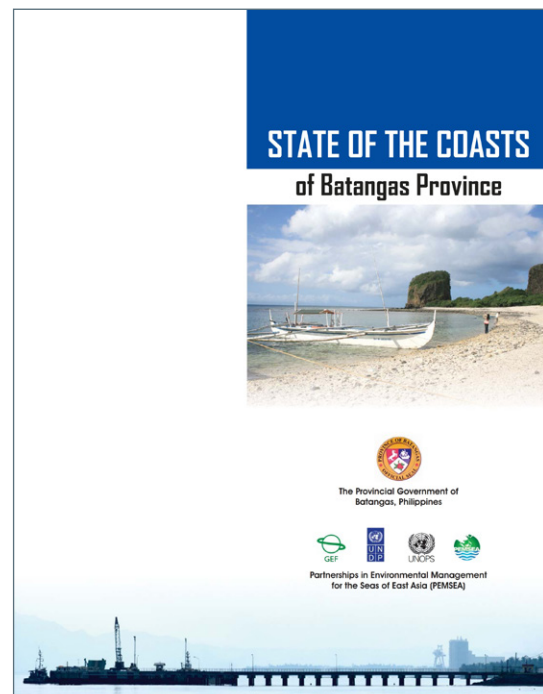
The SOC report of Batangas Province (PG-Batangas and PEMSEA, 2008) was the first comprehensive assessment of the province’s progress with regard to its adopted coastal management strategy, objectives, and actions. Batangas Province initiated its ICM program in 1994. The initial SOC report evaluated the province’s progress in putting in place the governance mechanisms and management programs to address the challenges to sustainable development of its coastal area over the period of 1990 to 2007. The initial SOC report showed four areas that required attention, indicating where the province needed to prioritize its management

efforts, namely: reclamation and conversion; air quality; municipal solid waste; and industrial, agricultural, and hazardous wastes.

The province responded with the following management actions:

- a. **Expanding the coverage of environmental quality monitoring.** The limited data sets for air quality indicated concern in terms of total suspended particulates, which exceeded the Philippine National Ambient Air Quality Guideline value. The data, however, were indicative only of the pollution levels within the vicinity of the monitoring station and not reflective of the extent of air quality in the province. In order to have a better assessment, the province, through the Batangas Environment Laboratory, has since been monitoring air quality as part of its regular environmental monitoring program.

The results of water quality also indicated insufficient or sporadic monitoring results making it difficult to have a clear assessment of water quality in the province’s bays and rivers. Batangas has since



³ Happy (smiling) face indicates improving trends; flat face indicates there is no conclusive trend and/or baseline data; frowning (unhappy) face indicates deteriorating trend; and dash (---) indicates no data.

Table 2. Summary of results for the core indicators (Batangas Province).**Core Indicators for SOC Reporting for Batangas**


















Category	SOC Code	Indicator	Trend* (1990–2007)
Governance			
Policy, strategies and plans	001	Coastal profile/Environmental risk assessment	
	002	Coastal strategy and action plans	
	003	Local government development plan, including coastal and marine areas	
Institutional arrangements	004	Coordinating mechanism	
	005	Participation of stakeholders in the coordinating mechanism	
Legislation	006	ICM enabling legislation	
	007	Administration and monitoring of compliance to legislation	
	008	Environmental cases filed/resolved	
Information and public awareness	009	Public education and awareness	
	010	Stakeholder participation and mobilization	
Capacity development	011	Availability/accessibility	
	012	Human resource capacity	
Financing mechanisms	013	Budget for ICM	
	014	Sustainable financing mechanisms	
Sustainable Development Aspects			
Natural and man-made hazard prevention and management	015	Level of preparedness for disasters	
	016	Degree of vulnerability to disasters	
	017	Social and economic losses due to disasters	

Table 2. Summary of results for the core indicators (Batangas Province). (cont.)

Category	SOC Code	Indicator	Trend* (1990–2007)
Sustainable Development Aspects			
Habitat protection, restoration and management	018	Habitat management plan and implementation	
	019	Areal extent of habitats	
	020	Protected areas for coastal habitats and heritage	
	021	Reclamation and conversion	
Water use and supply management	022	Water conservation and management	
	023	Access to improved water source	
	024	Incidences/deaths due to waterborne diseases	
Food security and livelihood management	025	Fishery management plan and implementation	
	026	Fisheries Production	
	027	Malnutrition rate	
	028	Poverty, education and employment	
	029	Livelihood programs	
Pollution and waste management	030	Management plans	
	031	Water quality	
	032	Air quality	
	033	Sanitation and domestic sewerage	
	034	Municipal solid waste	
	035	Industrial, agricultural and hazardous wastes	

* Legend: Improving Deteriorating Baseline data only or data not conclusive — No data

expanded its water quality monitoring program, covering the three bays and major river systems, and the number of parameters being analyzed.

b. Management of agricultural wastes. The SOC report indicated that agricultural wastes were contributing significantly to the deteriorating water quality in Batangas Bay and the rivers draining into the Bay. The province has since initiated a Batangas Bay watershed management project with a particular focus on the issue of agricultural wastes.

c. Operationalizing the Batangas IIMS database. One of the major challenges encountered during the development of the SOC report of Batangas was data gathering. Data were not systematically stored, and only recent data were readily accessible. Thus, trend analysis could not be performed for some of the indicators. Batangas has since re-established the integrated information management system (IIMS) database of the province in partnership with De La Salle Lipa University, one of the partner local institutions of the province, to facilitate storage and access to data for planning, assessing, and reporting purposes.⁴

The case of Guimaras Province, Philippines

The Province of Guimaras' SOC report (PG-Guimaras and PEMSEA, 2012) evaluated the status of the island province relative to the 35 core indicators from 2000 to 2009. The province initiated its ICM program in 2008. The report, which was adopted by the ICM Program Project Coordinating Committee⁵, set the baseline socioeconomic and ecological conditions of the area.

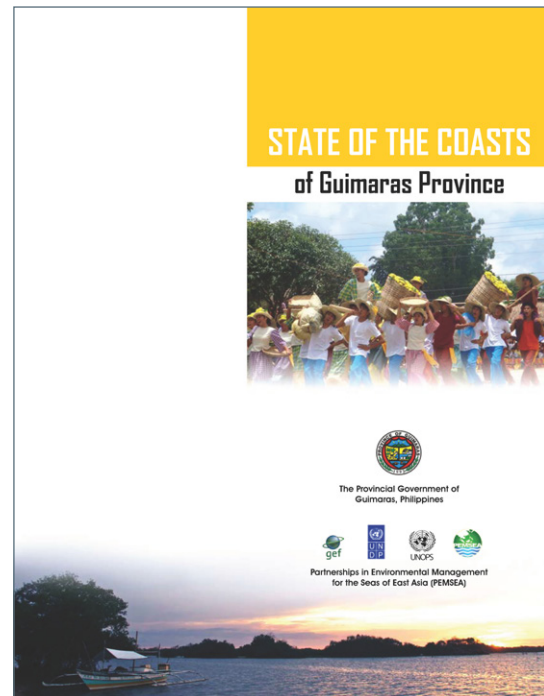
The following were the major outcomes of the Guimaras SOC:

a. Platform for integrated information gathering and sharing. Stakeholders acknowledged the need to organize and consolidate data from the

various sectors in order to have a comprehensive assessment of the social, economic, and ecological conditions of the area, including management interventions and implementing arrangements. With such recognition, stakeholders appreciated the SOC as a platform to share data and information, and consolidate the efforts of the different sectors on environmental management. The province has since regularly consolidated information from the different sectors for monitoring. It also has maintained its IIMS database to facilitate data storage, retrieval, and access.

b. Addressing data gaps. The lack of data on the extent of habitat resources was reflected in the SOC report. This precipitated the conduct of a habitat resources assessment by the Guimaras Environment and Natural Resources Office. Habitat monitoring continues to be undertaken in selected sites in the province.

Air quality is currently not being monitored in Guimaras as indicated in the SOC results. While



⁴ For further discussion, see Padura, et al. (this volume).

⁵ The Guimaras ICM Program Project Coordinating Committee (PCC) is the multisectoral coordinating and policymaking body of the ICM program in Guimaras. The PCC is chaired by the Provincial Governor and involves the LCE of the municipal government units and relevant sectors.

Table 3. Summary of results for the core indicators (Guimaras Province).**Core Indicators for SOC Reporting for Guimaras**






































Category	SOC Code	Indicator	Trend * (2000-2009)
Governance			
Policy, strategies and plans	001	Coastal profile and environmental risk assessment	
	002	Coastal strategy and action plans	
	003	Local government development plan, including coastal and marine areas	
Institutional arrangements	004	Coordinating mechanism	
	005	Participation of stakeholders in the coordinating mechanism	
Legislation	006	ICM enabling legislation	
	007	Administration and monitoring of compliance to legislation	
	008	Environmental cases filed/resolved	
Information and public awareness	009	Public education and awareness	
	010	Stakeholder participation and mobilization	
Capacity development	011	Availability/accessibility	
	012	Human resource capacity	
Financing mechanisms	013	Budget for ICM	
	014	Sustainable financing mechanisms	
Sustainable Development Aspects			
Natural and man-made hazard prevention and management	015	Level of preparedness for disasters	
	016	Degree of vulnerability to disasters	
	017	Social and economic losses due to disasters	

Table 3. Summary of results for the core indicators (Guimaras Province). (cont.)

Category	SOC Code	Indicator	Trend * (2000-2009)
Sustainable Development Aspects			
Habitat protection, restoration and management	018	Habitat management plan and implementation	
	019	Areal extent of habitats	
	020	Protected areas for coastal habitats and heritage	
	021	Reclamation and conversion	
Water use and supply management	022	Water conservation and management	
	023	Access to improved water source	
	024	Incidences/deaths due to waterborne diseases	
Food security and livelihood management	025	Fishery management plan and implementation	
	026	Fisheries Production	
	027	Malnutrition rate	
	028	Poverty, education and employment	
	029	Livelihood programs	
Pollution and waste management	030	Management plans	
	031	Water quality	
	032	Air quality	—
	033	Sanitation and domestic sewerage	
	034	Municipal solid waste	
	035	Industrial, agricultural and hazardous wastes	
* Legend:  Improving  Deteriorating  Baseline data only or data not conclusive — No data			

this is not yet a priority concern, it has been proposed in the Executive Legislative Agenda so that an airshed in the province can be designated and an air quality monitoring program can be initiated.

The case of Preah Sihanouk Province, Cambodia

The SOC report of Preah Sihanouk (PG-Preah Sihanouk and PEMSEA, n.d.) is the first comprehensive assessment of the coastal and marine environment in the province. Prior to the SOC report, there was an unpublished environmental profile that provided limited information about the status of coastal and marine environment in the province.

Cambodia's Minister of Environment, His Excellency Say Samal, has expressed his appreciation for the value of the SOC report of Preah Sihanouk Province, not only for the province but also for the entire country, in understanding the conditions and addressing the challenges of coastal and marine management. Minister Samal concluded that, "the SOC provides a comprehensive analysis of the coastal and marine management problems, solutions undertaken and the challenges encountered in the process. The report provides a simple format in assessing the efforts on ICM over the past 10 years (1998–2009) and identifies areas for improvement. The State of the Coasts of Preah Sihanouk Province complements and builds on existing provincial and national reports such as the State of the Environment and Socioeconomy."

The ICM program in Preah Sihanouk province, then the Municipality of Sihanoukville, was initiated in 2001. The SOC report was adopted by the ICM Project Coordinating Committee and resulted in the following:

Promoting integrated information gathering and sharing. The process of SOC development promoted information sharing, and better cooperation and commitment among the different departments and sectors in the province. Thus, information were compiled and a comprehensive assessment of the socioeconomic and ecological conditions of the area, was carried out. The SOC report provided a sound basis for planning and management.

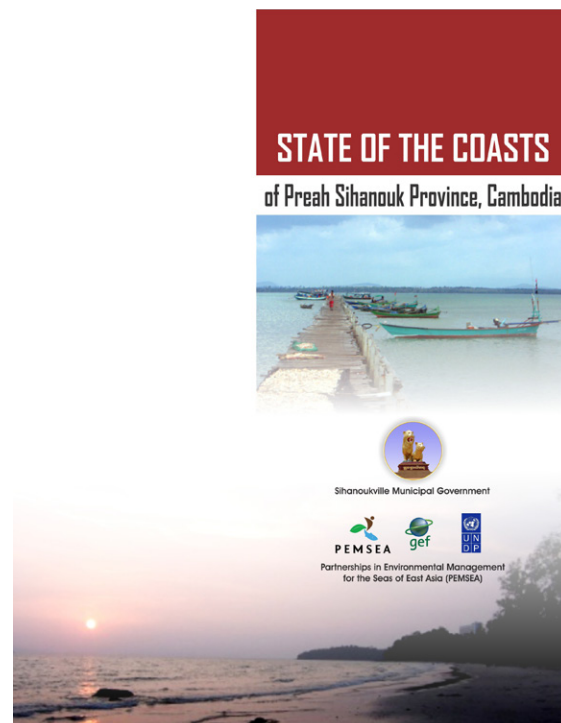


Table 4. Summary of results for the core indicators (Preah Sihanouk Province).**Core Indicators for SOC Reporting for Preah Sihanouk Province**


















Category	SOC Code	Indicator	Trend* (1998–2010)
Governance			
Policy, strategies and plans	001	Coastal profile/Environmental risk assessment	
	002	Coastal strategy and action plans	
	003	Local government development plan, including coastal and marine areas	
Institutional arrangements	004	Coordinating mechanism	
	005	Participation of stakeholders in the coordinating mechanism	
Legislation	006	ICM enabling legislation	
	007	Administration and monitoring of compliance to legislation	
	008	Environmental cases filed/resolved	
Information and public awareness	009	Public education and awareness	
	010	Stakeholder participation and mobilization	
Capacity development	011	Availability/accessibility	
	012	Human resource capacity	
Financing mechanisms	013	Budget for ICM	
	014	Sustainable financing mechanisms	
Sustainable Development Aspects			
Natural and man-made hazard prevention and management	015	Level of preparedness for disasters	
	016	Degree of vulnerability to disasters	
	017	Social and economic losses due to disasters	

Table 4. Summary of results for the core indicators (Preah Sihanouk Province). (cont.)

Category	SOC Code	Indicator	Trend * (1998–2010)
Sustainable Development Aspects			
Habitat protection, restoration and management	018	Habitat management plan and implementation	
	019	Areal extent of habitats	
	020	Protected areas for coastal habitats and heritage	
	021	Reclamation and conversion	
Water use and supply management	022	Water conservation and management	
	023	Access to improved water source	
	024	Incidences/deaths due to waterborne diseases	
Food security and livelihood management	025	Fishery management plan and implementation	
	026	Fisheries Production	
	027	Malnutrition rate	
	028	Poverty, education and employment	
	029	Livelihood programs	
Pollution and waste management	030	Management plans	
	031	Water quality	
	032	Air quality	
	033	Sanitation and domestic sewerage	
	034	Municipal solid waste	
	035	Industrial, agricultural and hazardous wastes	

* Legend: Improving Deteriorating Baseline data only or data not conclusive — No data

“Former Governor Sbhong Sarath of Preah Sihanouk Province encouraged the concerned departments and agencies to use the SOC report as a guiding document in identifying management measures to further promote sustainable development of coastal and marine areas in the province.”

Lessons Learned

A stage-wise, multisectoral and consultative process can promote ownership of SOC reports. While the different sites have varying experiences in the process of developing their SOC reports, it can be summed up that the active involvement of the different sectors in the area facilitated the SOC development and implementation process. The multisectoral, consultative, and consensus building process of preparing the report provided a platform for consolidating the different sectoral efforts and promoting ownership of the report.

Although integral to the SOC reporting process, the involvement of the different sectors can sometimes be challenging. Engaging them early in the process is necessary to promote ownership and participation.

Limited data availability can be addressed in follow-on monitoring programs. Common with most local governments in the EAS region, limited data availability is one of the biggest challenges in developing the SOC reports. Despite the involvement of the different sectors and stakeholders in the SOC process, some of the data required are not being collected (e.g., areal extent of habitats; incidences and deaths due to waterborne diseases). The involvement of the different sectors highlighted the need and use of these types of data, which can be included in follow-on monitoring programs.

IIMS can facilitate data accessibility and analysis.

Data accessibility is also another challenge. Oftentimes, data are not systematically stored or compiled making it difficult to carry out trend analysis on the area. The establishment of a computerized database and information management system, such as PEMSEA’s IIMS can facilitate data accessibility, storage, retrieval, and analysis in a consistent and systematic manner.

A multisectoral TWG can ensure data accuracy.

When two or more agencies/departments are gathering the same data, at times, discrepancies in reported data can be observed. This can be partly due to differing methods in data collection. One of the tasks of the multisectoral TWG is to agree on which data source/s will be considered in the preparation of the SOC reports. The question of data accuracy can be addressed by documenting all sources of data/information.

The SOC requires adequate capacity and budget.

The limited capacity on data analysis and interpretation is being addressed through training program and mentoring as part of the technical assistance for SOC being provided by PEMSEA to its ICM sites.

The SOC is meant to be an operating tool for local governments implementing ICM. Thus, the SOC needs to be updated regularly based on the planning and evaluation cycles of the local government. This will require local governments to commit adequate time, resources and budget to sustain the SOC reporting system.

Way Forward

ICM programs adapt and evolve as new and emerging issues (e.g., climate change) and area-specific concerns (e.g., ecosystem approach to

fisheries management, urban areas) arise. As more data and information are needed to manage the coastal area, additional indicators can be identified and evaluated beyond the 35 core indicators, which would allow in-depth assessment of the socioeconomic and environmental conditions of the site and the effectiveness of the management interventions carried out.

It is envisioned that more local governments in the EAS region will be preparing their SOC reports, as part of the ICM scaling up efforts in the region. Some 50 local government members of the PEMSEA Network of Local Governments signed the Dongying Declaration in 2011 and committed to prepare their SOC reports. As more local governments publish their SOC reports, a clearer picture of the status of the coastal and marine areas in the EAS region is expected.

Aiming to mainstream the use of SOC as an M&E and reporting tool for local governments, an initiative to develop online interactive SOC reporting is underway. Local governments which have yet to prepare their SOC reports can undergo a self-assessment of their performance relative to the 35 core indicators as part of the online SOC platform. This initiative is part of a collaborative project between World Bank and PEMSEA on the development of a regional knowledge management platform for coastal and ocean governance.

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The Benefits of Establishing and Sustaining the Batangas Environment Laboratory in Batangas Province, Philippines

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Key Message

- A water quality monitoring program is a necessary component of integrated coastal management (ICM). It provides scientific data on pollution levels and impacts, serves as a useful basis for management planning, thereby informs and engages stakeholders on the state of the environment, and allows timely intervention.
- Maintaining an environment laboratory to support a monitoring program is costly but can eventually be sustained by stakeholders that require such services, particularly when the laboratory attains accreditation. It also increases local capacity, which can help with ICM scaling up and replication.

Abstract

The Batangas Environment Laboratory under the Provincial Government-Environment and Natural Resources Office of Batangas

Province (PG-ENRO) is the Philippines' first environmental monitoring laboratory operated by a local government. This experience demonstrated that providing quality laboratory services to local government and the private sector is not only feasible, but also an essential component of ICM. The laboratory was established in 1998 to overcome the problem of fragmented and inconsistent monitoring data collected by different academic institutions and private entities.

The local government recognized the crucial role of a laboratory in a monitoring program and persisted despite difficulties in maintaining it during the initial years. Local capacity in environmental monitoring enables quick detection of trends so that appropriate policy and management interventions can be activated within shorter response periods. This helps to improve governance, political will, and decisionmaking. Strong connections with stakeholders improved the sharing of

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information and knowledge, which allowed for faster collective decisionmaking. As a technical arm of the provincial government, the laboratory provides scientific data on the environmental quality of different water bodies including groundwater resources. Continued improvement and investments towards excellence have elevated it to a nationally accredited and internationally recognized laboratory. This case study highlights the need for an efficient environmental monitoring program to contribute to effective coastal management and the value of a dedicated environmental laboratory.

Background

The Province of Batangas established the ICM program in 1994 to help address the issues and challenges associated with pollution prevention and management (PG-ENRO, 1996; Chua, 2006; PEMSEA, 2006). The province was identified as a major industrial growth area in the Philippines, a center for port development and a trans-shipment hub (MTE, 1996). Batangas Bay was home to shipyards, petrochemical and oil refineries, and chemical, textile, and steel fabrication companies. The natural attributes of Batangas Bay made it suitable for port activities.

In the early 1990s, about 80% of ships docked in public ports while the rest in private ports. Industrial companies had their own port and berthing facilities and used the bay's shoreline for mooring, anchorage, and location of seawater intake pipes for cooling processes in their facility operations. Industrial expansion was leading to increased vessel traffic rendering adjacent areas unsuitable for fishing and recreational activities. With the upgrade of Batangas Port to an international, alternative port to Manila, shipping activity consequently was increasing which further intensified resource use conflicts, pollution, and the risk of oil spills and ship accidents.

Municipal and commercial fisheries were active but the encroachment of commercial fishers into the fishing grounds of municipal fishers was increasing the conflict between them and causing dwindling of fish stocks. Coastal and marine habitats were degraded because of overexploitation, overfishing, and use of illegal fishing methods. Erosion and siltation from the denuded watershed impacted heavily on seagrasses and coral reefs. About 61% of the province's total land area was devoted to agriculture, including coconut and sugar plantations, intermixed with backyard and commercial poultry and pig farming (MTE, 1996).

Growth of the coastal population and settlements was also accelerating with the expanding economic development further escalating the problems of domestic waste collection and disposal and the sustainable use of marine resources (MTE, 1996). Environmental (water) quality was deteriorating with the accumulation of solid wastes because of inadequate disposal facilities. The use of chemical fertilizers in agriculture was also increasing significantly. Controlling nonpoint sources of nutrients from backyard livestock raising activities was difficult. The disposal of untreated industrial wastes was also starting to become a concern. Domestic, industrial and agricultural wastes were entering the waterways, rivers, and coastal areas, aggravating the efforts in marine pollution prevention.

Prior to ICM adoption, monitoring data were fragmented and inconsistent based on studies by different academic institutions and private entities (PEMSEA, 2006). With the assistance of scientists from the University of the Philippines – Marine Science Institute (UP-MSI), baseline environmental data for the bay were acquired. The results of the environmental study showed that a potential health risk was imminent unless further efforts were taken to identify and assess pollution sources and the extent of pollution loads, and to institute pollution control measures. While

the principal use classification of Batangas Bay was for the propagation of fish and other aquatic life, beaches on the western side of the bay were being used for swimming, diving, and snorkeling. Regular monitoring of pollution levels including coliform counts was needed so that timely health advisories could be issued. This highlighted the need for an on-site laboratory with adequate equipment and qualified personnel. With the establishment of the ICM program, the Province of Batangas was becoming more cognizant of the challenges associated with pollution prevention and management, the need for sound scientific information, and the development of local capacity.

Approach and Methodology

Collaborative Water Quality Monitoring Program: the development of the Batangas Environment Laboratory

An initial five-year Integrated Environmental Monitoring Program (IEMP) was designed for the Batangas Bay region to regularly assess the state and trends in marine pollution and to ascertain what improvements were occurring as a result of pollution management schemes (Chua, 2006; PEMSEA, 2006). The primary concern of the local government was that an environmental monitoring program is costly. A strategy to create collaborative monitoring was explored for cost sharing and other financing instruments. The idea was to engage multiple partners in water sampling, data gathering, analysis and decisionmaking.

Institutionally, both a structure and an integrated monitoring platform were missing. It was not until 1995, when PG-ENRO was created and became operational that the blueprint for the Batangas Environment Laboratory (BEL) came into fruition¹. The functional multisectoral coordinating mechanism, Batangas Bay Region Environmental Protection Council (BBREPC), was also established.²

Prior to establishing BEL, an assessment of the capabilities of various institutions and companies to obtain and analyze marine environmental samples in the bay was carried out. The assessment also identified appropriate laboratories that could be engaged to create a self-sustaining monitoring program. The assessment activity involved visits to four hospitals, a water district office, two colleges, and 17 industrial firms. These institutions were identified as potential collaborators in the development and implementation of a marine pollution monitoring program where analysis of the major pollution parameters could be performed using existing laboratories in the bay area.

With the start of the monitoring program in 1998, PG-ENRO secured partnerships with various institutions. While it refurbished a small building to house BEL, hired two chemists, and provided a budget for maintenance and operating expenses (Figure 1), contributions were made by partner companies, and academic and local government institutions. PEMSEA provided other basic equipment needed by the laboratory.

¹ The PG-ENRO acts as the lead coordinating agency. It is primarily mandated to coordinate and integrate the implementation of management programs among the different stakeholders in Batangas. Its more significant tasks include: (1) developing the operational plans and strategies for implementing environmental and natural resources programs and projects; (2) enforcing pollution control and environmental protection laws, rules, and regulations; and (3) coordinating the ICM program among various stakeholders.

² The BBREPC is a venue for consultation and dialogue among the local government, national agencies, the private industries, academic institutions, and NGOs on the need for and utilization of monitoring information for management. It is chaired by the governor of Batangas. The BBREPC provides policy direction and oversees the formulation, adoption, and implementation of management interventions.

Figure 1. The BEL building in 1998.



Twenty sampling stations were designated as survey sites in Batangas Bay and two in Calumpang River in Batangas City (the largest tributary entering the bay). Water from these stations was sampled every quarter for basic parameters including biochemical oxygen demand (BOD), chemical oxygen demand (COD), total coliform and fecal coliform, nutrients, oil and grease, transparency, chlorophyll, salinity, temperature, and pH.

Initial challenges

The initial five-year plan to sustain the marine pollution monitoring program lasted only two years. It did not succeed as planned. Most of the Memoranda of Agreement between PG-ENRO and its partners were not renewed due to lack of initiative and interest. Co-financing arrangements with the industries involved in the monitoring activities, as stipulated in their Environmental Compliance Certificates, were not followed through. The BEL personnel also experienced difficulty in coordinating and conveying water samples to the private laboratories. One partner agency complained of additional workload on its quality control department. In some instances, the BEL personnel had to analyze samples in the laboratory of a partner due to insufficient staff. Addressing logistics requirements such as access to a boat and fuel use also became a problem. The Philippine Coast Guard (PCG) had only a small

budget for fuel and no available boat. Another partner could only provide a small boat which posed safety risks to BEL personnel. In 2000, PG-ENRO stopped collaborating with partner agencies in monitoring except PCG. This was a difficult period for the laboratory because of insufficient budget.

However, BEL continued with the analysis of water quality parameters including pH, temperature, and nutrients (i.e., ammonia, phosphate, nitrate, and nitrite). From 2000 to 2003, PCG used its tugboat for water sampling but this arrangement had to be stopped due to increasing gasoline consumption. Subsequently, a stronger coordination with the Province's General Services Office was effected in order to acquire 45 liters of gasoline per sampling activity. The gasoline, in turn, was supplied to a private boat in exchange for their services of transporting BEL personnel during sample collection within the Batangas Bay area.

Adjustments made

Due to financial constraints and lack of personnel, BEL reduced the monitoring sites to 8 instead of 22 stations as initially identified. The basis of monitoring station selection in Batangas Bay was the point and nonpoint sources of pollutants and those within the mixed zone of industries operating within the Bay area.

On 19 March 2003, the PG-ENRO through BBREPC facilitated the approval of Sangguniang Panlalawigan Resolution No. 077: “A Resolution Passing into Law Provincial Ordinance No. 3-S. 2003 Authorizing the Imposition of Fees for the Services Rendered by the Batangas Environment Laboratory (BEL).” The law will sustain the operation of BEL because its operation is expensive for the provincial government.

The BEL also tapped funds from the Department of Energy (DOE) through Energy Regulation 1-94A which stipulates that 1% of 1 centavo per kilowatt hour generated by a power plant shall be set aside for Electrification Fund (EF), Development and Livelihood Fund (DLF), and Reforestation, Watershed Management, Health and/or Environment Enhancement Fund (RWMHEEF). A proposal for the procurement of equipment to be used by BEL was submitted to DOE and on 7 November 2002, the National Power Corporation and the Province of Batangas entered into a Memorandum of Agreement allocating PhP 5.25 million (US\$ 102,000) for additional laboratory equipment.

The BEL bought an atomic absorption spectrophotometer with vapor generation accessory for heavy metals analysis, BOD meter assembly, COD assembly, bacteriological

measuring equipment, and ambient air quality monitoring equipment for total suspended particulate, sulfur dioxide and nitrogen dioxide, and a noise level meter.

Simultaneously, PG-ENRO worked out the transfer of BEL laboratory facility to the Sangguniang Kabataan Building, a two-storey building adjacent to the PG-ENRO building to accommodate the additional equipment. Then Governor Hermilando I. Mandanas allocated a budget for the laboratory fixtures amounting to PhP 900,000 (US\$ 17,000). On 24 June, 2004, the Province inaugurated the upgraded BEL facility (Figure 2).

Another problem encountered with the program was the frequent turnover of chemists who were moving to more stable jobs. Several justifications were made to increase the number of personnel in the laboratory and to create additional positions for the BEL operation. In 2011, two Environmental Management Specialist positions were created. The BEL then started working on the accreditation or recognition of water, and wastewater quality parameters by the Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB). In February 2005, the DENR-EMB Central Office and the DENR-EMB Region 4A conducted the first level assessment of the laboratory.

Figure 2. The BEL facility starting 2004.



Results

The BEL facility today is operated by four full-time chemists in addition to three laboratory personnel. The PG-ENRO water quality monitoring program now covers Batangas Bay (eight stations) and Calumpang River (nine stations) (Figure 3). Additional stations are monitored in response to requests (and complaints of pollution discharges). In mid-2007, PG-ENRO initiated the monitoring of coastal waters of Balayan Bay covering five stations.

The BEL now has the capability to analyze water quality parameters for water and wastewater and ambient air as shown in Table 1.

The Provincial Government approved a PhP 29 million (US\$ 620,000) budget for a new PG-ENRO

building inclusive of a new laboratory with rooms for microbiological analysis, air quality analysis, instrumentation for toxic metal and trace organics analysis, a storage area for chemicals, a hot room and a central laboratory where other water analysis can be carried out.

Contributions to planning and decisionmaking

Knowledge sharing and direct linking of information to management

The sharing of monitoring data leads to collective understanding of the benefits and impacts of management interventions. As such, it is imperative that monitoring information is accurate, relevant, and regularly communicated to managers and decisionmakers.

Figure 3. Water quality monitoring program in Batangas Province.

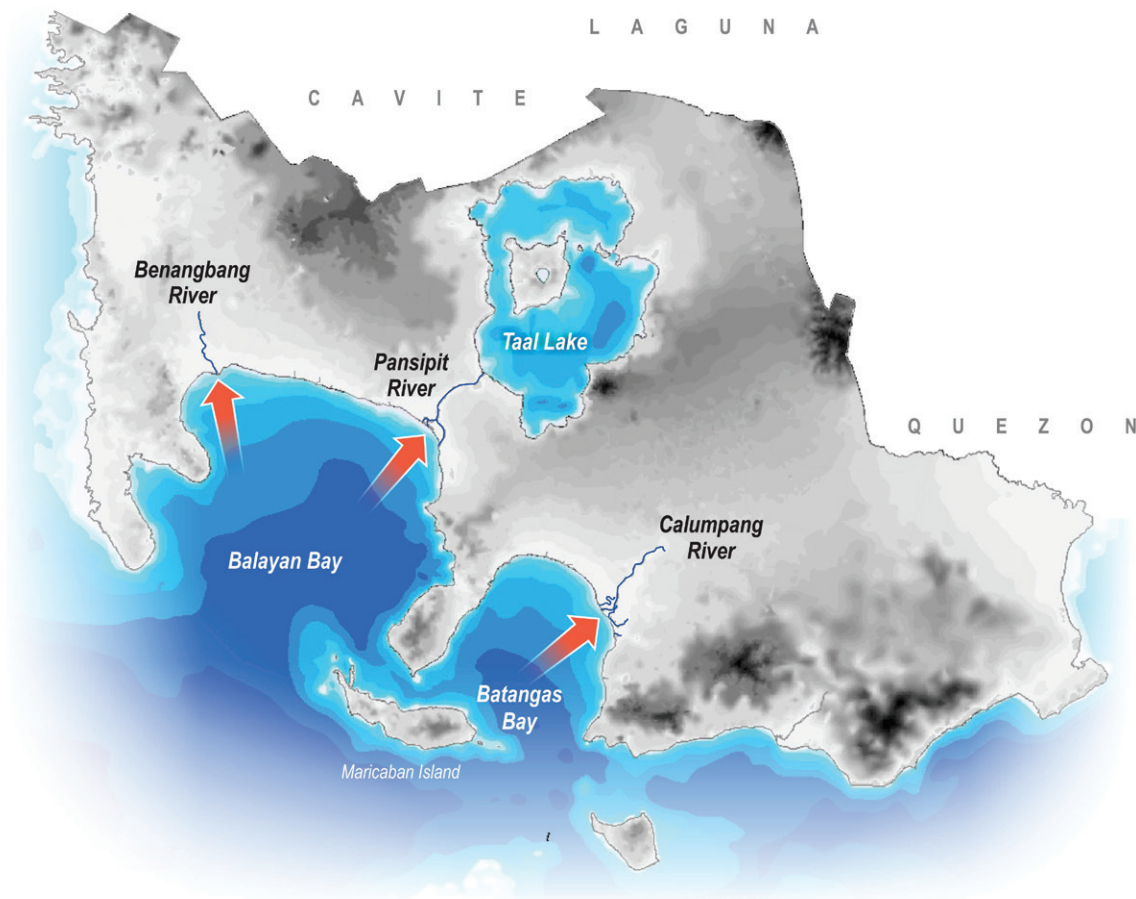


Table 1. Water quality parameters performed by BEL.

Type of sample	Water and wastewater quality parameters
Potability testing	acidity, alkalinity, ammonia, carbonate and bicarbonate, color, turbidity, hardness, magnesium, chlorides, total solids, settleable solids, conductivity, total dissolved solids, resistivity, salinity, odor, nitrate, phosphate, lead, chromium hexavalent, total chromium, manganese, zinc, copper, cadmium, iron, pH, temperature, <i>E. coli</i> , total coliform count, fecal coliform count, heterotrophic plate count
Fresh, marine and waste water	total solids, settleable solids, total dissolved solids, odor, nitrate, phosphate, lead, chromium hexavalent, total chromium, manganese, zinc, copper, cadmium, iron, dissolved oxygen, pH, temperature, phosphate, total suspended solids, total coliform count, fecal coliform count, BOD, oil and grease, <i>E. coli</i> , COD
Ambient air	total suspended particulates, sulfur dioxide, nitrogen dioxide
Noise level	decibels

The Province of Batangas' ICM program adopted a long-term and transparent water quality monitoring strategy, which proved very useful in understanding the resource systems of the Batangas Bay area. A quarterly report on the state of the region's water quality was prepared and submitted to BBREPC. For example, over the years, the results of the monitoring program indicated that there was a significant decrease in total coliform count (TCC) in Barangay Tabangao from 160,000 and 500,000 MPN/100mL for May 2009 and June 2011, respectively, to less than 300 MPN/100mL for the years 2012 to 2015. The TCC in other sampling stations were below the DENR Administrative Order No. 34 Guideline Value for Class SC Waters which is 5000 MPN/100mL (Figure 4). The dissolved oxygen (DO) in Batangas Bay remained within the acceptable guideline value, with the exception of a sampling in June 2007 that coincided with heavy rains (Figure 5).

Special meetings were held to address emerging issues or emergencies. This regular monitoring provided the local government with timely information about water quality in the bay and allowed problems such as harmful algal blooms and fish kills to be identified immediately.

The data generated were used to pinpoint hotspots and to identify necessary management interventions. For example, results of the Pansipit River water quality monitoring showed that the total coliform levels in some parts of the river (Figure 6) exceeded the guidelines value for Class B waters of 1000

MPN/100mL, indicating the continuous discharge of untreated domestic sewage and animal waste as the likely sources of contamination.

Several pollution complaints were received and acted on by BEL providing sampling and analysis of wastewater. The results indicated that some industries and establishments were discharging wastewater that did not conform to water quality standards set by DENR. Such good practices heightened the awareness of local government executives on the importance of scientific data to identify establishments that were polluting water bodies in the province. More importantly, pollution issues were immediately addressed through specific interventions.

Replication and increased public awareness and participation

The ICM program in the Batangas Bay Region has now been expanded and replicated to include the Balayan Bay area and key river systems. The PG-ENRO's- BEL monitoring activities in Batangas Bay area has likewise expanded.

The monitoring program in the Balayan Bay area started in 2007 through a small grant from PEMSEA to Anak Balayan, a people's organization in Balayan, Batangas. In response to the request of the Municipality of San Luis in Batangas and in support of the mangrove planting project of PG-ENRO Forest Management Section, the monitoring activity was

Figure 4. Monitoring data of total coliform count in Batangas Bay, 2004–2015 (adopted and updated from PG-Batangas and PEMSEA, 2008).

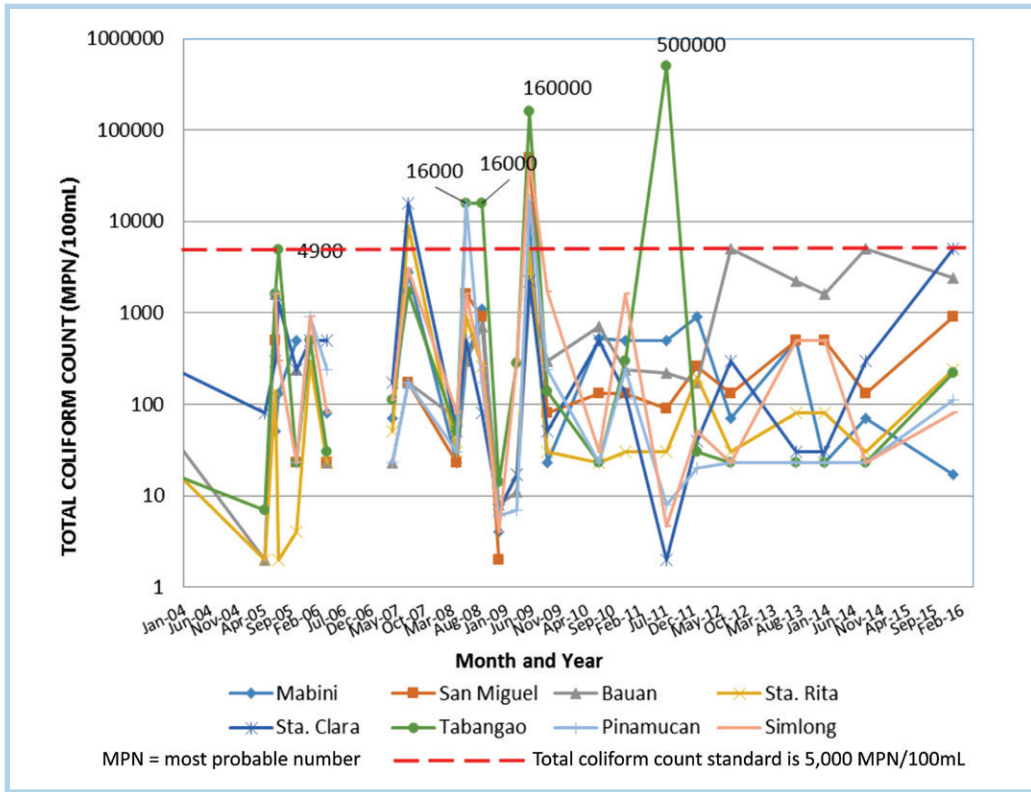


Figure 5. Dissolved oxygen in Batangas Bay, 2004–2015 (adopted and updated from PG-Batangas and PEMSEA, 2008).

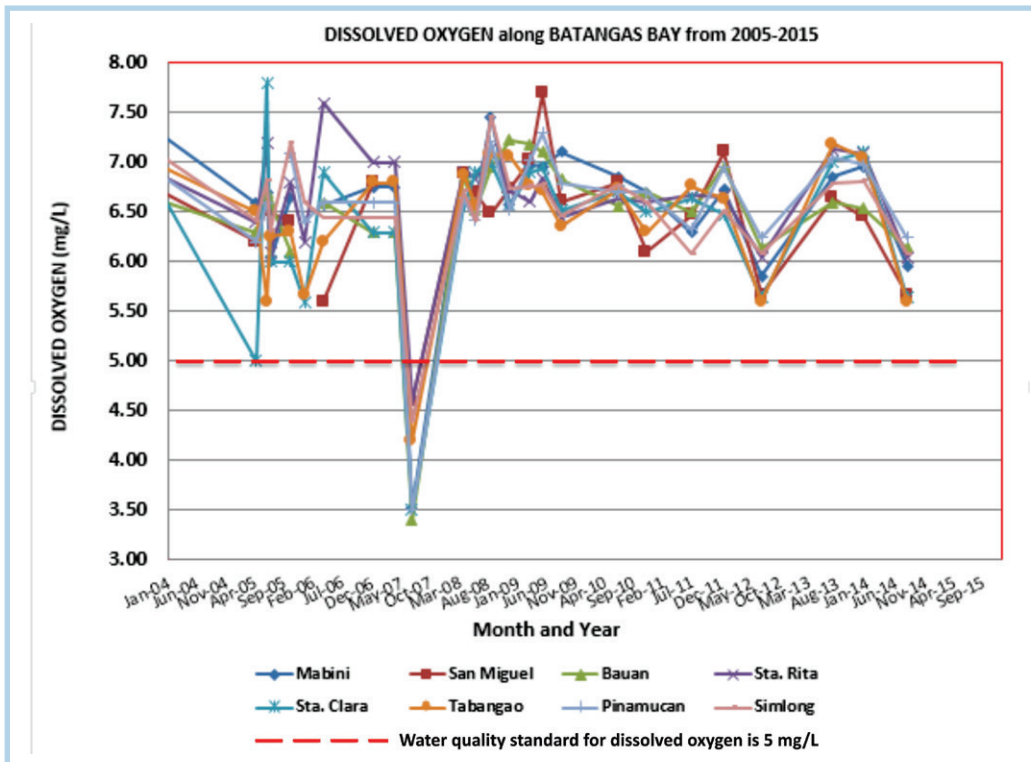
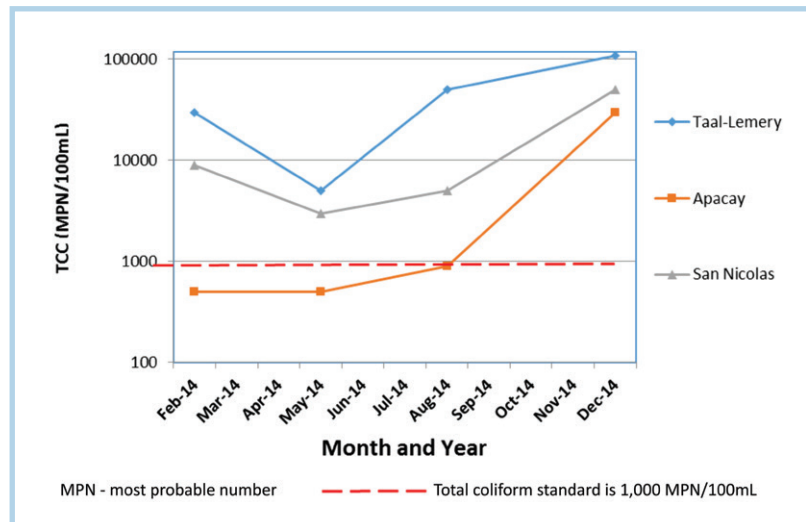


Figure 6. Total coliform count in Pansipit River, 2014.

extended to San Luis coastal area. Results showed that there was a decrease in total coliform count especially in stations in Binambang and Barangay 9 with reference to the results in 2007 (Figure 7). The TCC in other stations showed conformance to the guidelines value set in DENR Administrative Order No. 34 for Class SC Waters, i.e. 5000 MPN/100mL. Figure 8 shows that dissolved oxygen levels in Balayan Bay area were consistently conforming with the DENR minimum guidelines value of 5 mg/L.

The BEL also attended to complaints on river pollution and assisted in the river rehabilitation programs of selected local government units. One of the notable programs involving BEL's assistance was the rehabilitation of Kawakawa River, a project launched by SANDIWA Multipurpose Cooperative, a nongovernment organization in San Jose, Batangas. The BEL conducted water quality assessment of the river stream which led to the identification of various sources of agro-industrial pollution coming from different tributaries of Kawakawa River. The results of the water sampling activities facilitated the resolution and/or minimization of pollution problems in the area. The monitoring results were used by the SANDIWA Multipurpose Cooperative to

mobilize the community to participate in the river cleanups. Consequently, the river was launched as a swimming and laundry area for public use, creating heightened community awareness and participation in cleanups, watershed management, and water recycling.

Stronger partnerships with industries and the academe

Multisectoral collaboration among stakeholders within the Batangas ICM system was enhanced as a result of the knowledge gained through the monitoring program and the analysis of results. There is now an appreciation of the changes in environmental trends and how the resource system of Batangas is responding to development and other interventions.

The partnership with industries through participation in the quarterly meetings, where results of quarterly monitoring in Batangas Bay area were presented to members of the Batangas Coastal Resources Management Foundation (BCRMF), has been strengthened. Since the monitoring stations are within the mixed zone of several industries within the Batangas Bay area, the results regularly flag selected industries on the status of ambient water quality in the bay area.

Figure 7. Total coliform count in Balayan Bay, 2007–2013.

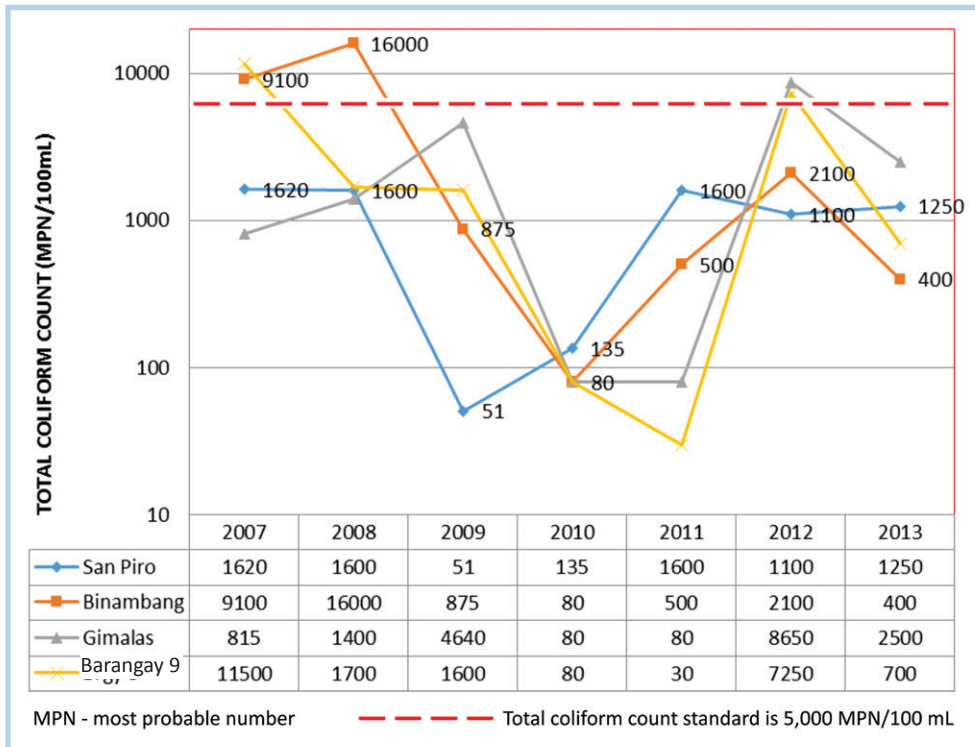
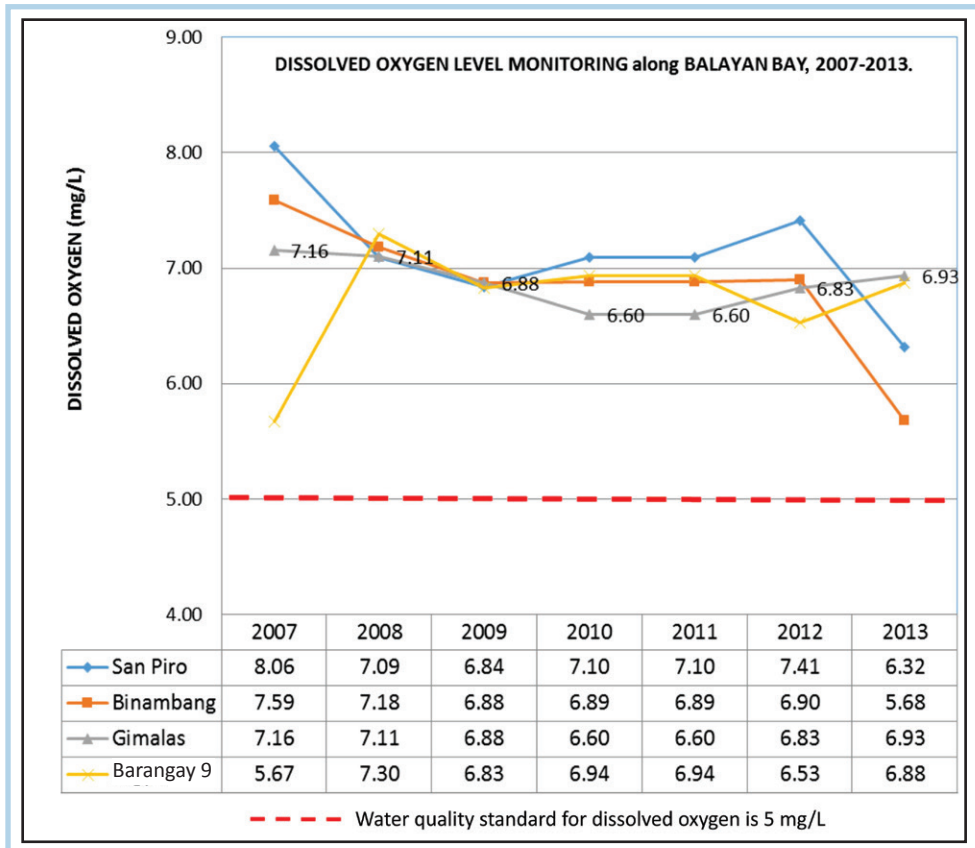


Figure 8. Dissolved oxygen in Balayan Bay, 2007–2013.



The BEL was able to acquire data from the results of water quality testing of different rivers within the province by giving assistance and/or accepting clients from academe partners/clients, which identify rivers within the province as their study areas. Although, the data generated were treated as privately owned, they were used as reference material when needed.

Sustaining the monitoring program

Return on investment

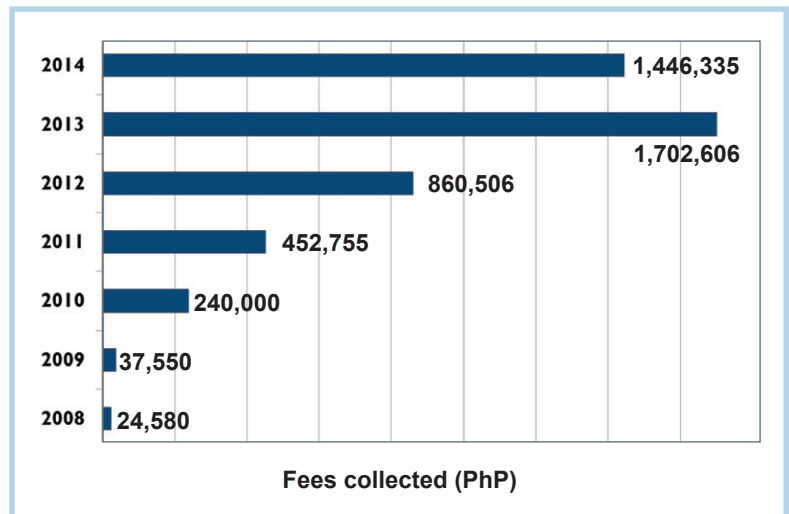
Private clients have become a source of income for BEL and an important contribution to the continued monitoring of the environmental quality of ambient air and water within the province using the laboratory's facility. The BEL also led in responding to several pollution complaints lodged at PG-ENRO relating to water and air pollution. In 2012, BEL was able to collect PhP 860,506 (US\$ 20,000) from private clients of which, about PhP 211, 260 (US\$ 5,000) was spent for monitoring purposes. The amounts were based on the schedule of fees stipulated in Provincial Ordinance No. 003 S. 2003. In 2013, the collected revenue amounted to about PhP 1.7 million (US\$ 40,000) (Figure 9).

Aside from supporting the income generation objectives of the province, accepting influent, effluent, freshwater and seawater samples with corresponding fees from private clients helps PG-ENRO in monitoring the quality of industrial wastewater being discharged to bays and rivers. This has no additional cost to the provincial government. Table 2 shows the corresponding increase of water sampling and analysis both for monitoring and those received from private requests.

Certification and excellence

The BEL continued to improve as an environment laboratory and sought certification and recognition

Figure 9. Return on investment: total fees collected, 2008–2014 (average exchange rate: US\$1: PhP44.2293).



for excellence (Figures 10–11). To be able to pursue its plan to accommodate environmental samples for compliance monitoring of industries and to generate environmental data in connection with the environmental impact assessment system, environmental monitoring and research activities in support of the formulation and implementation of policies, criteria, guidelines, rules and regulations and other activities of the Environmental Management and Protected Area sector of DENR, BEL secured all requirements for recognition from different certifying agencies. Some of the requirements are Hazardous Waste I.D. Registration issued in March 2006, Environmental Compliance Certificate issued in December 2007, Certificate of Compliance to the Regulation of Fire Code of the Philippines of PG-ENRO BEL Project issued in October 2008, and Accreditation for Pollution Control Officer issued for the Batangas Environment Laboratory Project in September 2008. Finally, DENR certificate of recognition was signed by the DENR Secretary in June 2009. The BEL also worked on its accreditation by the Department of Health (DOH) which was issued in July 2012.

To date, BEL has 28 ambient water and air quality parameters recognized by DENR-EMB and is accredited by DOH for bacteriological, physico-chemical and heavy metals parameters.

Table 2. Water sampling and analysis demand.

		2007	2008	2009	2010	2011	2012	2013	2014
Number of sampling done	Monitoring	9	37	9	15	22	43	6	10
	Private	1	9	22	25	50	89	78	88
Number of samples	Monitoring	35	40	92	28	119	657	11	96
	Private	5	35	46	109	310	409	347	451
Number of analysis conducted	Monitoring	105	320	442	249	389	1,060	40	856
	Private	25	140	162	814	1,151	2,452	2,016	3,296

On 31 August 2014, BEL was awarded the PNS ISO/IEC 17025:2005--Certificate of Accreditation in the field of Chemical Testing as specified in the Scope of Accreditation. The accreditation recognizes BEL's technical competence for specific tests or measurements for drinking water, sewage, industrial wastes, other waters such as fresh, marine, and ground water and the operation of a laboratory quality management system that meets the principles of ISO 9001:2008.

Scaling up the investments for ICM

The DENR Protected Area Management Board designated Taal Lake as a Water Quality Management Area. As a partner agency of the Batangas Province, DENR tapped the services of BEL to take part in the establishment of monitoring sites in lakes and river tributaries. The BEL serves as their third party laboratory. Likewise, BEL is in partnership with DENR-Protected Area Wildlife and Coastal Zone Management Service both in western and eastern Batangas for the establishment of monitoring sites for water quality assessment in marine protected areas of Fuego Point in Nasugbu, Bagong Silang in Calatagan, Maricaban Strait in Tingloy, and Pagkilatan in Ilijan, Batangas City. The data generated served as reference for the province to identify which areas are considered as environmental hot spots and need intervention. This is also true in the case of ground water resources where community awareness of the continuous depletion of ground water has been the basis for

launching watershed management initiatives and water recycling among LGUs, national government agencies, and the industrial sector.

Lessons Learned

More effective pollution management under an ICM program can be feasible with the establishment of an environmental monitoring laboratory by a local government.

Local capacity in environmental monitoring can enable quick detection of trends so that appropriate policy and management interventions can be activated within shorter response periods. This helps to improve governance, political will, and decisionmaking and improve confidence and efficiency in project operation and implementation.

For example, in Batangas, pollution control measures were established for identified sources of pollution, particularly for livestock raising enterprises. Environmental Clearance (EC) approval was incorporated into the Batangas Province Environment Code (2012). The EC approval is issued to the requesting industry only after the sampling and analysis of its wastewater/sewage treatment plant discharges are completed and proven to be within acceptable limits.

Batangas' strong connections with its stakeholders improved the sharing of information and

knowledge, which allowed for faster collective decisionmaking and made BBREPC more sensitive to issues on the ground. Making scientific information/advice available at the local level can improve efficiency, effectiveness, and relevance of management interventions. For example, communities were mobilized for coastal cleanups in response to high coliform levels in analyzed water samples. Residents were also directed to refrain from using the coasts and rivers as dumping areas for household and sanitary wastes. The monitoring information facilitates direct linkages between scientific data, decisionmaking, and action. It further strengthens community awareness and participation in management interventions.

Enhancing public awareness and participation in all phases of the program development, implementation, and monitoring promotes perception change and ownership.

Monitoring data can give a better understanding of how water bodies and the associated resource systems respond to development and management actions.

This was particularly evident for the BEL monitoring data for the Calumpang River, the main tributary to Batangas Bay. The river acts as a catchment basin for all domestic and livestock wastes under the jurisdiction of two cities and

Figure 10. DENR-EMB compliance audit of BEL.



Figure 11. Certificate of Recognition/ Accreditation by DENR and DOH.



six municipalities. An extensive water quality monitoring program identified priority pollutants and potential sources of contamination. The Calumpang River cleanup was included as a priority of the Batangas Bay Rehabilitation Program.

Continuous improvement and investments in excellence can elevate the capacity and recognition of a local laboratory to an internationally recognized laboratory.

The BEL is now the technical arm of the provincial government of Batangas providing scientific data on the environmental quality of different water bodies. The local government recognized the crucial role of a laboratory for a monitoring program and persisted despite difficulties in maintaining it during the initial years. The BEL operates as a DENR and DOH-recognized laboratory and monitors not only the water quality of Batangas Bay and Balayan Bay and their tributaries but also ground water resources in the province. Its success did not come overnight but through a painstaking, day-to-day decisionmaking, learning, and performance evaluation process. The laboratory's staff remain committed to the provision of quality testing by consistently improving and expanding BEL services and maintaining compliance with the requirements of regulatory bodies and the Philippine National Standard ISO/IEC 17025:2005.

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Climate Change Adaptation and Disaster Risk Mitigation in Da Nang, Viet Nam

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Key Message

- Over the past decade, the impacts of climate change were increasingly evident in Da Nang City and the coastal areas of Viet Nam, including loss of lives, property, livelihood as well as adverse impacts on the local economy. Appropriate preparedness and response measures were needed in a timely manner in local areas prone to impacts of climate change.
- In addition to national policy, strategies, and guidelines to address climate challenges, local governments play an important role in implementing appropriate preventive and management measures. The ICM system was adopted and implemented in Da Nang in 2000. It provided a comprehensive planning and management framework, which enabled Da Nang City government to implement a broad-based, integrated governance program including responding to climate challenges.

Abstract

Climate change was identified as both an immediate and long-term problem for Da Nang. Major disasters that occurred in recent years were significantly impacting the lives and well-being of the people, livelihood, property, and infrastructure especially in business and services sectors. Weaknesses in the governance system prior to ICM adoption limited the coordination and planning processes and efficient implementation of integrated action plans to address climate challenges.

Da Nang's response was guided by the principles of sustainable development and the key elements of integration and coordination embedded in the ICM program, adopted in 2000. The program contributed to strengthening local governance, leading to better coordination, increased capacity, and improved awareness. This provided potential organizations wishing to enter

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into partnership with Da Nang some level of confidence that the local government could efficiently implement the necessary actions.

Over the past decade, Da Nang implemented various adaptation and mitigation measures under its ICM program to alleviate the impacts of climate change. These included: (a) enhancing institutional mechanisms and policies; (b) improving planning processes by utilizing research results on vulnerability assessments; (c) increasing public awareness and understanding; (d) capacity strengthening; (e) developing preventive and mitigating plans for climate challenges; and (f) promoting energy-efficient practices.

Background

Da Nang, a prime city in central Viet Nam, is one of the most important economic growth centers of the country. It has been undergoing rapid urbanization and industrialization over the past decade resulting in a steady growth of the economy and spatial structure. The World Bank identified Viet Nam as among the countries most vulnerable to the impacts of climate change in view of its geographical location. Historical profiles and local testimonies indicated that typhoons, floods, drought, and tidal and flash floods were the most significant natural hazards affecting the city. These in turn generated secondary hazards such as spread of pollution, disease risks, river and shoreline erosion, landslides, and saltwater intrusion. Impacts of these hazards included loss of livelihood, mortality, heightened health risks from injury and environmental contamination, loss of property, and damage to homes, business, services, and infrastructure. (CtC and HU, 2009; Dieu, et al., 2012).

Natural disasters and their impacts on the local economy, society, and environment

The typhoons and flooding that occurred in recent times, believed to be aggravated by climate change, caused serious damage and loss to the city, in terms of socioeconomic and environmental impacts. Some of the major typhoons and flooding that occurred in recent years were:

- a. A big flood in November 1999 that affected many districts and communes in Da Nang. Damage to property was estimated at VND 3.8 billion (US\$ 272,969) with a death toll of 595. Two upstream rivers, Vu Gia River and Yen River, caused the overflowing of Han River. Dozens of fishing boats, moored on the banks of Han River, were swept out to sea. Flooding also occurred in Tuy Loan River. The Da Nang International Airport was closed for 23 hours because of the flooding while a state emergency was declared in the city.
- b. Typhoon No. 6 (Xangsane) with winds exceeding Level 12, based on the Beaufort Scale, landed in central Viet Nam in 2006. The typhoon caused deaths and severe damage to property and infrastructure (Figure 1). Reported deaths were 59 with 7 missing; 527 injured; 16,000 houses collapsed; roofs of more

Figure 1. Fallen trees due to typhoon Xangsane.



than 250,000 homes blown off; 52,000 houses submerged; and 579 boats damaged. Total damage was estimated at VND 10 billion (US\$ 627,904).

- c. A flood in November 2007 caused by a tropical depression brought heavy rains across the central provinces (Figure 2). Flooding of Da Nang's rivers reached an alarming Level 3 exceeding that of the 1999 flood peak by 0.3 m. Ten of the eleven communes in Hoa Vang were affected by the flood which required the immediate transfer of the 15,000 emergency shelters that have been set up. Floodwaters submerged thousands of homes in Ngu Hanh Son and Cam Le districts. Some 100,000 inhabitants from 22,000 households were evacuated.
- d. Typhoon Nari hit Quang Nam and Da Nang in October 2013 with maximum sustained winds equivalent to Level 12. Eleven people were injured in hard hit areas and thousands of homes collapsed partially or completely while roofs of houses and buildings including schools and health centers were blown off (Figure 3). Total damage was estimated at VND 886.6 billion (US\$ 42.6 million).

Figure 2. Floods in November 2007.



Figure 3. Typhoon Nari struck down the row railing on Bach Dang Street



Losses due to climate change

According to the Scenario of Viet Nam Climate Change, which was updated in 2012, changes in rainfall and increasing temperatures could cause Da Nang's sea level to rise from 11.6 cm to 11.8 cm and an area of about 2.4 km² could be vulnerable to flooding by 2030. Signs of climate change impacts were increasingly evident in recent years with typhoons becoming stronger, more unpredictable, and more frequent resulting in serious economic losses in some sectors.

a. Surface water. Salinity intrusion was affecting the supply water to the city. Salinity at the Red River Bridge was usually exceeding the standards episodically from March to August every year with each episode lasting from 5 to 7 days. Since the hydropower plants located upstream of Vu Gia River started operation, the salinity level at the Red River Bridge increased as more water was drawn from the An Trach Dam. Hence, appropriate measures were needed to prevent salinity intrusion downstream.

b. Infrastructure and urban transport. Landslides associated with heavy rainfall were posing significant risks to communication structure, key transport system and road network of Da Nang City, specifically on 14G Highway, 602 Provincial Highway, and 1A Highway. Damage to communication lines was affecting intercity traffic flow, commercial activities, and tourism.

1A Highway is a vital transportation route linking Quang Nam and Da Nang, as well as traffic in all coastal areas from north to south. It has the highest risk exposure to floods. Flooding or prolonged losses in this segment were causing the redirection of traffic, putting pressure on the provincial road or the 609-607 Provincial Highway 14B Highway to Ho Chi Minh road (NR14).

The railway line linking Hanoi and Ho Chi Minh City through Da Nang was also at high risk from flooding. This was the only railway linking Hanoi with Ho Chi Minh City. The route was at risk from flooding on both sides of the Cam Le River and near the bank of the Cu De River. Damage to this route could lead to rail traffic disruption for freight and passengers between Hanoi and Ho Chi Minh and freight to and from the Tien Seaport.

c. Infrastructure for trade and tourism activities.

The climate in Da Nang is considered an important resource for tourism development. However, climatic disturbances, causing damage to infrastructure and resulting in limited access points, as well as cancellations of flights and tours, and disruption of other support services such as supply of natural products, were significantly affecting tourism arrivals and activities. The peak of tourist arrivals and events in Da Nang usually occur from May to September, coinciding with the typhoon and tropical depression seasons.

Soil erosion at the estuaries and along the beach and landslides along the riverbank were occurring frequently in Da Nang. Many riparian areas were severely eroded. Landslides were particularly serious along Son Tra Peninsula and South Hai Van.

d. Energy use and greenhouse gas emissions. Rapid urbanization of Da Nang during the past ten years increased energy consumption. Improvement in the standard of living resulted in significant increase in the use of large electrical appliances in many households and commercial service facilities (e.g., hotels, commercial centers).

Electricity consumption by the service sector increased seven times from 2006 to 2013 with hotels and commercial centers accounting for 70 percent of total electricity consumption. According to the normal growth scenario up to 2025, energy consumption in these sectors would continue to rise. Thus, by 2025, greenhouse gas emissions due to energy consumption in households and services were estimated to increase three times that of 2010 according to the normal growth scenario.

Approach and Methodology

Da Nang's response to climate change, identified as an immediate and long-term policy, was guided by the principles of sustainable development and the application of integrated planning and management. The response was in line with the broad-based multistakeholder participatory approach and the socioeconomic development plan of Da Nang City and the national government's strategy on climate change and disaster risk reduction. The city implemented various adaptation and mitigation measures to alleviate and respond to the impacts of climate change. These included enhancing policies and organizational mechanisms, improving the planning processes by utilizing results from research studies on vulnerability assessments, increasing public awareness and understanding, capacity strengthening, and promoting energy-efficient practices. The ICM program, which began in 2000, has facilitated the development and implementation of measures addressing some of the challenges identified (Box 1).

Box 1. Challenges in responding to the impacts of climate change (CtC and HU, 2009).

- Limited planning and technical skills of local staff involved in climate change adaptation and disaster risk reduction;
- Limited knowledge of and awareness on the integration of natural disaster mitigation and management into social development;
- Lack of scientific basis for integration of climate change adaptation into the socioeconomic development plan; and
- Limited assessment of livelihood development following the implementation of the resettlement program for high-risk communities.

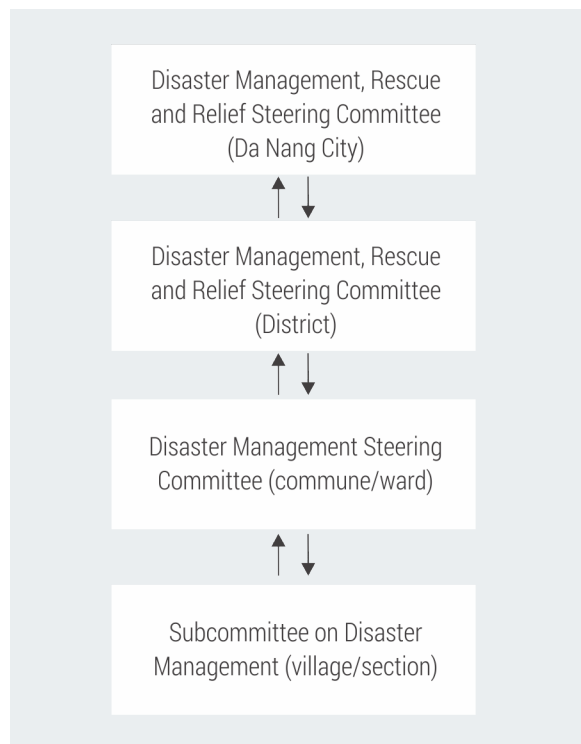
Results

Improving the organizational mechanism

In addition to the Department of Natural Resources and Environment, which served as the lead agency responsible for implementing the “National Target Program for Responding to Climate Change”, the city had also established and operationalized the Disaster Management, Rescue and Relief Steering Committee at the city, district, and commune levels (Figure 4).

At the city level, the Steering Committee was chaired by the vice chair of the People's Committee and co-chaired by the vice director of the Department of Agriculture and Rural Development. The secretary of the committee was the head of Irrigation Branch and Flood and Typhoon Control. The members were directors of departments, including the director of Police, head of City Army Force and chairpersons of the eight districts.

Figure 4. Coordination mechanism for disaster response.



The coordination mechanism was guided by the “four-local preparedness principles” (i.e., local commands, local forces, local means, and local logistics).

Issuance of policies and guidelines in response to climate change

In line with the National Action Plan, the city issued policies, decisions and guidelines as shown in [Box 2](#), relating to environmental protection, energy savings and efficiency measures, reduction in greenhouse gas emissions, and activities to support green growth.

Conduct of research to incorporate management measures into local plans

Research activities were conducted to assess the vulnerability and impact of climate change and provide the basis for the development, updating of plans, and orientation of future activities in response to climate change.

In 2011-2012, within the framework of the National Target Program on Responding to Climate Change, the city conducted research on the vulnerability of the city, districts, and three sectors, i.e., agriculture, water resources, and tourism. This initiative considered the accomplishments of the Asian Cities Climate Change Resilience Network (ACCCRN), an initiative of the Rockefeller Foundation in the United States. ACCCRN aimed to catalyze attention, funding, and action on building climate change resilience for poor and vulnerable people, by creating robust models and methodologies for assessing and addressing risk through active engagement and analysis of various cities, including Da Nang.

From 2011, Da Nang City implemented the following studies on climate change adaptation under the ACCCRN framework:

- Vulnerability assessment on the impacts of climate change to tourism development in Da Nang;

Box 2. Key documents issued by Da Nang City.

- Decision No. 1281/QD-UBND dated 17/02/2011 on the establishment of city-level Steering Committee to respond to climate change and sea level rise.
- Programme of Action No. 27-CTr/TU dated 31/07/2013 of Da Nang City Commission on the implementation of the Central Resolution 7 (XI) “Actively respond to climate change, strengthen management natural resources, and environmental protection.”
- Decision No. 6901/QD-UBND dated 24/08/2012 of the Municipal People’s Committee on approving the plan to respond to climate change and sea level rise in Da Nang City by 2020.
- Decision No. 1349/QD-UBND dated 04/3/2014 of the Municipal People’s Committee on approving the plan to actively respond to climate change, enhancing resource management and environmental protection in Da Nang City.
- Decision No. 7123/QD-UBND dated 10/08/2014 on approving the plan to rehabilitate the environment after the occurrence of storm and flood in Da Nang City.
- Decision No. 7493/QD-UBND dated 21/10/2014 on approving the plan for prevention and response to the consequences of disaster scenarios.

- Pilot study on forecasting and early warning system for flooding in rivers;
- Assessment to determine the resilience of water resources to the impacts of climate change;
- Research to assess the level of flooding in support of urban planning in suburban pilot areas (i.e., Hoa Tien, Hoa Chau communes, and Hoa Xuan wards);
- Establishment of a database on climate change; and
- Study to integrate climate change concerns into the Socio-Economic Development Plan of Da Nang City for the period 2016-2020.

Other relevant projects and research activities conducted in response to climate change included the following:

- Evaluation, calculation, and prediction of energy consumption and greenhouse gas emissions in six districts. Proposed solutions to reduce greenhouse gas emissions were identified under the project, with technical support for the implementation of action plans to respond to climate change. Additional focus areas included climate change mitigation in urban areas and implementation of typhoon-resilient houses and energy saving measures;
- Development of strategies on resilience for Da Nang City under the 100 Resilient Cities (100RC) Program; and
- Research and technical support on land use planning for sensitive areas at risk of disaster in the urban development process under the project, including strengthening the implementation of tools and guidelines for land use planning.

Enhancing public awareness on climate change

Relevant organizations/agencies in Da Nang City had organized numerous communication activities to enhance public awareness on climate change

and energy saving measures for the People's Committees of 7 districts, 56 communes, and wards; officials of Viet Nam Fatherland Front Committee and social organizations and unions at all levels in the city; teachers, students, group leaders, and the general public. New and diverse forms of communication were utilized for different target audiences. These included training, contests, forums, study tours, websites and social networking. The communications focused on the: (1) causes, manifestations, and global, national and local effects of climate change; (2) documents and policies to cope with the climate change at all levels; and (3) role of the various stakeholders and citizens in response to climate change.

Updating zoning scheme

Results from the vulnerability assessment initiatives were important as these provided information on the location of high-risk areas and vulnerable groups. The city conducted specific assessments and identified areas threatened by erosion, flash floods, high tides, landslides, and storm surges. Relocation of affected population in high-risk areas was necessary. Based on the data from the Department of Construction, Da Nang government moved and resettled more than 70,000 households during a 10-year period as part of the urban rehabilitation process (Dieu, et al., 2012).

Updating the earlier coastal use zoning plan, one of the outputs of the ICM program, was necessary to ensure that the plan has adequately considered the increasing impacts of climate change especially those along the tourism development zones located at Son Tra and Ngu Hanh Son districts.

Strengthening technical capacity

Capacity strengthening measures were in place, including the capability to apply engineering measures to reduce risks and damage to life,

livelihood, and infrastructure. These measures were: increased investments in equipment and enhanced forecasting capacity; upgrading of engineering and construction works; and strengthening rescue and communication efforts (Dieu, et al., 2012). The following adaptation priorities were also recommended based on the results of the hazard, capacity, and vulnerability assessment conducted in Da Nang in 2009: hazard preparedness and mitigation; improving planning processes; enhancing pollution control; and strengthening livelihood options for the poor (CtC and HU, 2009).

Lessons Learned

Identifying and assessing challenges and impediments to action. Da Nang faced the following challenges in crafting an effective response mechanism to address the impacts of climate change and sea level rise:

- Inadequate capacity to adapt to climate change for rational use of resources in urban rehabilitation, upgrading, and development;
- Adaptability of the poor and areas at risk to protect and ensure the quality of life, security and sustainable development;
- Inadequate resilience of infrastructure, community, and industry groups;
- Ineffective coordination between the departments in planning and developing plans to take into account the impacts of climate change;
- Need for mainstreaming climate change into the resettlement program, especially to provide social services and livelihood support;
- Need for enhancing the capacity and quality of forecasts and disaster warnings;
- Need for the development of a database on climate change; and
- Inadequate monitoring projects and the need for effective implementation of action plans in response to climate change.

Strengthening capacities and responses through collaborative efforts. To address the above challenges, Da Nang City continuously exerted efforts over the years with the assistance of the following programs and project, within the framework of the ICM program:

- ACCCRN, supported by the Rockefeller Foundation, conducted the hazard, capacity, and vulnerability assessment in 2009;
- Agence Francaise Development assisted in the development of Climate Change and Sea Level Rise Response Plan to 2020, which was approved by the People's Committee in August 2012;
- Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH supported the implementation of the Project on "Environment and Climate-friendly Urban Development" in 2011-2013;
- Asian Development Bank, under the Ministry of Industry and Trade, implemented a project to support the National Target Program on Climate Change Response, focusing on energy and transportation in 2012-2014; and
- Seeds Asia Project focused on the development of capacity on community-based risk management for schools in Central Viet Nam in 2011-2014.

In the process of implementation of the various efforts, the following are the lessons learned:

Effective institutional mechanism is necessary to respond to climate change. An effective coordinating mechanism, which is under the direction and guidance of the city leadership, facilitates cooperation and collaboration between line agencies and levels of governments. Such coordinating mechanism promotes research activities to support joint planning and implementation of climate change preparedness and response. It also facilitates effective communication to enhance public awareness on the impacts of climate change.

Timely response to climate change reduces loss of lives, livelihood, and local economy. While climate change adaptation policy, strategies, and guidelines have been developed by the central government, their implementation through specific action plans in a timely manner depends on the efficiency of local governments. Timely response reduces loss of lives, property, and livelihood, and damage to the local economy.

Building capacity and public awareness increase effective response to climate change. Local communities are directly affected by the impacts of climate change. However, they also serve as a central force for immediate response to climate change. As such, awareness enhancement for this group can increase the efficiency of preparedness and response in a timely manner. Da Nang's experience has shown that the conduct of climate change workshops, training, and competitions created a culture of safety among the communities. Similarly, integrating climate change issues into the annual and regular training programs of local officials increased their capacity in implementing climate change policies and action plans.

Ability to use scientific research contributes to effective intervention of climate change policy, strategy and action plans. The ability of the Da Nang government to translate findings from scientific studies undertaken by various national and international programs and projects into local climate change adaptation policies, legislation/administrative orders, and management plans greatly enhanced the local government's capacity to respond to climate change. Da Nang's experience also demonstrated the value of integrating science into policymaking and decisionmaking processes.

Strengthening stakeholder platforms generates and mobilizes resources and participation of stakeholders in response to common climate challenges. In the process of developing and implementing action plans and programs on climate change, the Da Nang government was able to use stakeholders' consultation as a platform to forge broad-based support for climate change preparedness and response. The city successfully mobilized human and financial resources from various line agencies and organizations, including the Viet Nam Fatherland Front Committee of Da Nang City, unions, People's Committees of districts, communes, and villages to take part in the research activities and vulnerability assessments and to propose solutions and programs including clarifying roles and responsibilities in the implementation of action plans.

ICM provided a framework for national and international cooperation in sustainable development, including responding to climate change. The ICM program contributed to the strengthening of local governance leading to effective implementation of action plans, which brought sustained benefits to the communities and stakeholders. These initiatives provided potential partners and other organizations with the needed confidence in investing in climate change projects.

The ICM program of Da Nang, which started in 2000, implemented activities to: (a) facilitate multidisciplinary coordination to address the gaps and overlaps in coastal resources management and environmental protection; (b) address multiple use conflicts through coastal use zoning plan; (c) institutionalize the integrated management system into the local government policy and

planning processes; and (d) enhance local capacity for planning and implementation, including utilization of supporting tools and methodologies (i.e., integrated information management system, state of the coasts reporting, risk assessment, etc.). As such, the ICM program provided a broad planning and management framework for sustainable development and laid the foundation for other national and international partners to work together on local challenges to sustainable development, including climate change impacts.

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Enhancing the Preparedness and Response to Oil Spills in Bohai Sea: Dongying Experience

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Key Message

- Environmental and socioeconomic risks from oil spills can be effectively mitigated with the combination of a national policy framework, effective institutional arrangements, contingency planning from national to enterprise level, and strengthening of oil spill detection and monitoring capacity.

Abstract

The economic prosperity of Dongying City largely depends on the development of the oil and gas industry which generates substantial financial revenues for the city's economic growth and social development. Located at the estuary of Yellow River which discharges into Bohai Sea, Dongying City is vulnerable to the impacts of human activities in Yellow River Delta and Bohai Sea area, including oil and gas exploration and exploitation, mariculture, and shipping and port operation activities. Oil spills from ships and oil drilling and extraction activities

are some of the major environmental risks that could significantly damage large areas of wetlands, nature reserves, mariculture activities, and tourism. While oil spill preparedness and response are the primary responsibility of the national and provincial governments, the local government of Dongying City plays an active role in complementing national and provincial efforts in oil spill risk reduction. The city actively develops local oil spill preparedness and response plans; develops cooperation programs and partnerships with industries; strengthens local management and coordination capacity, especially in oil spill response and claims for compensation; and effectively utilizes scientific information and technology and expert advice for decisionmaking and response actions. Close cooperation and coordination with concerned agencies, the support of the public, and efficient law enforcement are required. Thus, oil spill preparedness and response are included as essential and regular activities within the natural and human-made disaster component of the ICM program of Dongying City.

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Background

The Bohai Sea, a shallow, semi-enclosed sea in the People's Republic of China, has a total area of 77,000 km² and 2,300 km of coastline. Average water depth is 18 m with the deepest point of 85 m at Bohai Strait (Liu, et al., 2014; Tong, et al., 2014). It is connected with the adjacent Yellow Sea through the narrow Bohai Strait. The Bohai Sea is bordered by three provinces (Liaoning, Shandong, Hebei) and one municipality (Tianjin City), covering the Laizhou Bay in the south, Liaodong Bay in the north, and Bohai Bay in the west. Due to the shallow depth and narrow connection with the outer ocean, water exchange is relatively slow and with limited flushing or “self-cleaning” capacity (Dang, et al., 2013).

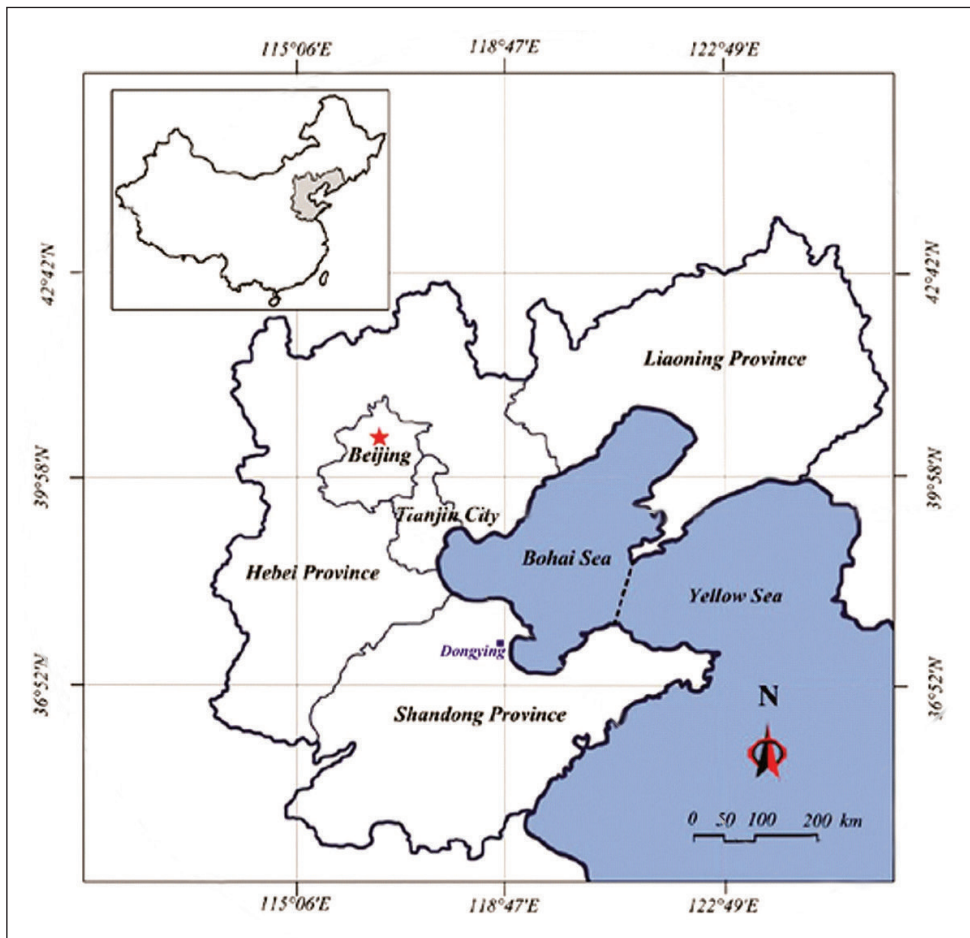
In the last few decades, the Bohai Sea region experienced rapid and significant economic and

social development. By 2010, approximately 20% of the country's population lived in the region. Although the region constitutes only 6.8% of the total area of the country, it produces 25% of the country's GDP (Liu, et al., 2013).

Dongying City is located in the estuary of Yellow River, adjacent to Bohai Sea (Figure 1). Its 413-km coastline is used substantially, through heavy marine resource exploitation, mariculture, and shipping and port activities, connecting the Bohai economic zone and the Yellow River economic zone. The sea areas and beaches in the city are used for wetland conservation, sea-farming, salt-making, tourism, port development, shipping, gas and oil extraction, and other industrial developments.

The offshore oil and gas extraction and processing industry is the largest contributor to the marine

Figure 1. The location of Bohai Sea and Dongying City (Tong, et al., 2014).



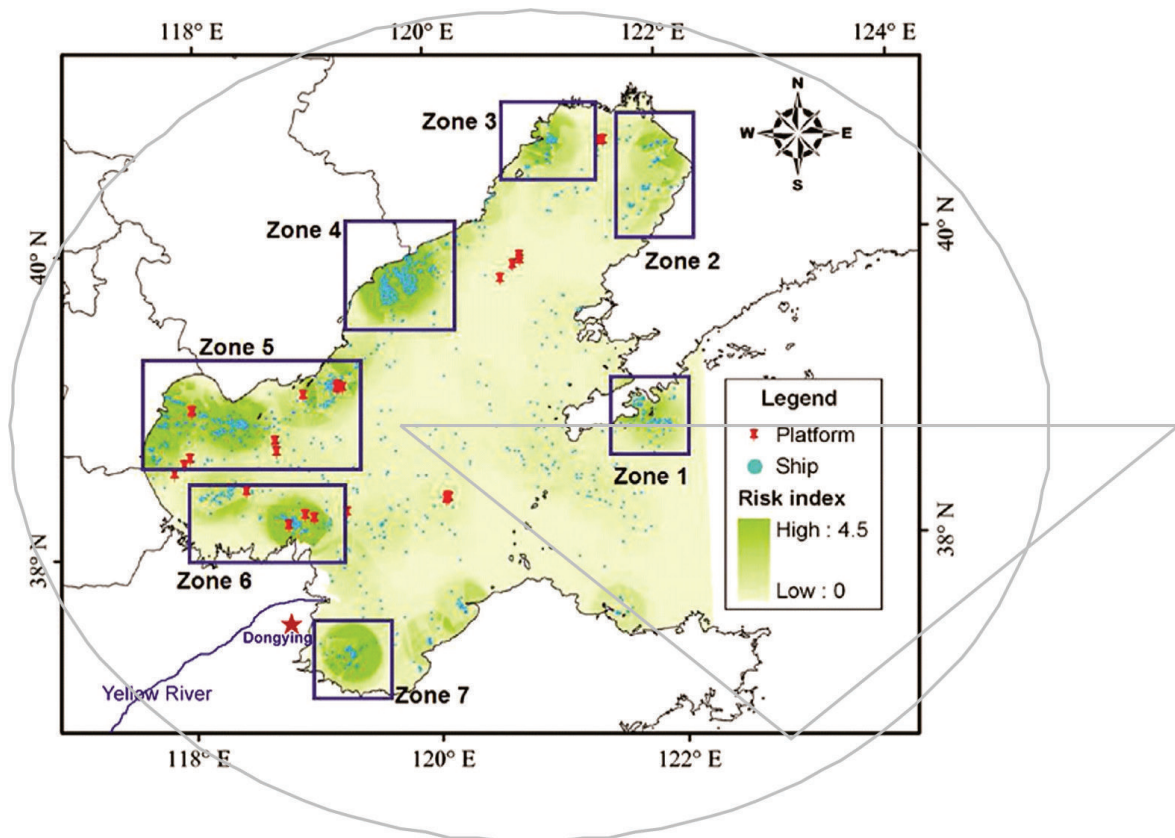
economy in Dongying City. In 2008, extraction activities generated RMB 10 billion (US\$ 1.57 billion), accounting for 47% of marine industrial outputs. In particular, Shengli Oilfield, the second largest oilfield in PR China, contains 48.3 billion tons of petroleum geological reserves (80% can be found in Dongying territory) and 230 billion m³ of natural gas geological reserves (Liu, et al., 2013).

Oil spills are an inherent risk associated with offshore petroleum activities. At present, Bohai Sea has 285 platforms, 3,181 operating wells, and 1,600 km of submarine pipelines. Their operation poses high risk of oil spills. Satellite images identified locations of potential spills related to both ship transportation and oil drilling activities in Bohai Sea, with seven high risk zones identified (Figure 2). In recent years, three major oil spill accidents occurred in Dongying

Sea area (the “Le’an No. 16”: 975 tons; the Shengli oilfield in No. 106 area: 150 tons; and the submarine pipelines of Shengli oilfield penetrated by pilferers: 16,523 tons). These oil spill accidents caused direct economic losses amounting to as much as RMB 400 million (approximately US\$ 63 million) (Liu and Zhu, 2014).

This case study presents the efforts and experience of the Dongying City government to reduce the risks of oil spills by strengthening its legislative and institutional arrangements; developing oil spill emergency response plans and compensation schemes; improving communications; securing support from experts and the effective use of information technology; and strengthening local capacity and partnerships with industries. Such risk reduction measures were also integrated into

Figure 2. Risk evaluation of potential oil spill in the Bohai Sea based on satellite images together with recorded accident data and literature information. Oil drilling platforms are marked in red, while light blue indicate ships. Oil spill risk index is shown in green. Seven high-risk zones (Zones 1-7 were offshore of Dalian, Yingkou, Huludao, Qinhuangdao, Tianjin, Huanghua, and Dongying) were identified and marked in blue (Liu et al., 2015).



the city's ICM program to take advantage of its overall planning and management framework and the coordinating mechanism and consultative platforms. PR China has adopted the ICM concept since the early 1990s to promote sustainable coastal development (Lau, 2005; Chua, 2008; Wu, et al., 2012).

Approach and Methodology

The ICM program in Dongying City, which started in 2005, enabled the local government to develop a comprehensive and integrated natural and human-made disaster response and management program so that it could consolidate available resources across government agencies to address common threats regardless of institutional mandates.

The Dongying City government actively cooperated with national and provincial efforts in reducing the risk of oil spills by developing city level oil spill preparedness and response action plans. The steps involved were:

- 1. Build upon the legal and institutional framework for oil spill preparedness and response at the national level.** PR China ratified the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC) in November 2009 and issued a series of laws and regulations concerning the prevention and management of marine pollution from ships. The country's ratification of the OPRC served as a driving force and framework that enabled PR China to improve its national system for emergency responses to oil spills from shipping as well as from oil and gas exploration and production activities.

Specifically, the State Council of the People's Republic of China issued a notice in 2013 identifying the State Oceanic Administration (SOA) as the responsible organization for the prevention of pollution damage from marine oil and gas exploration. The SOA was responsible for monitoring and managing marine environments, organizing marine environment surveys, and conducting scientific research. It was also responsible for the prevention and control of pollution from offshore construction projects and marine dumping. All offshore operators were required to develop oil spill contingency plans for their operations which are to be approved by SOA.

Dongying City worked closely with SOA through its provincial and local agencies to ensure local preparedness in the event of oil spills. The city government incorporated risk reduction from oil spills as part of the natural and human-made disasters management component of its ICM program to effectively utilize local resources from related government agencies, including those from the Ministry of Environment and Ministry of Agriculture and Fisheries in addressing oil spill concerns (Dongying City Government, 2013).

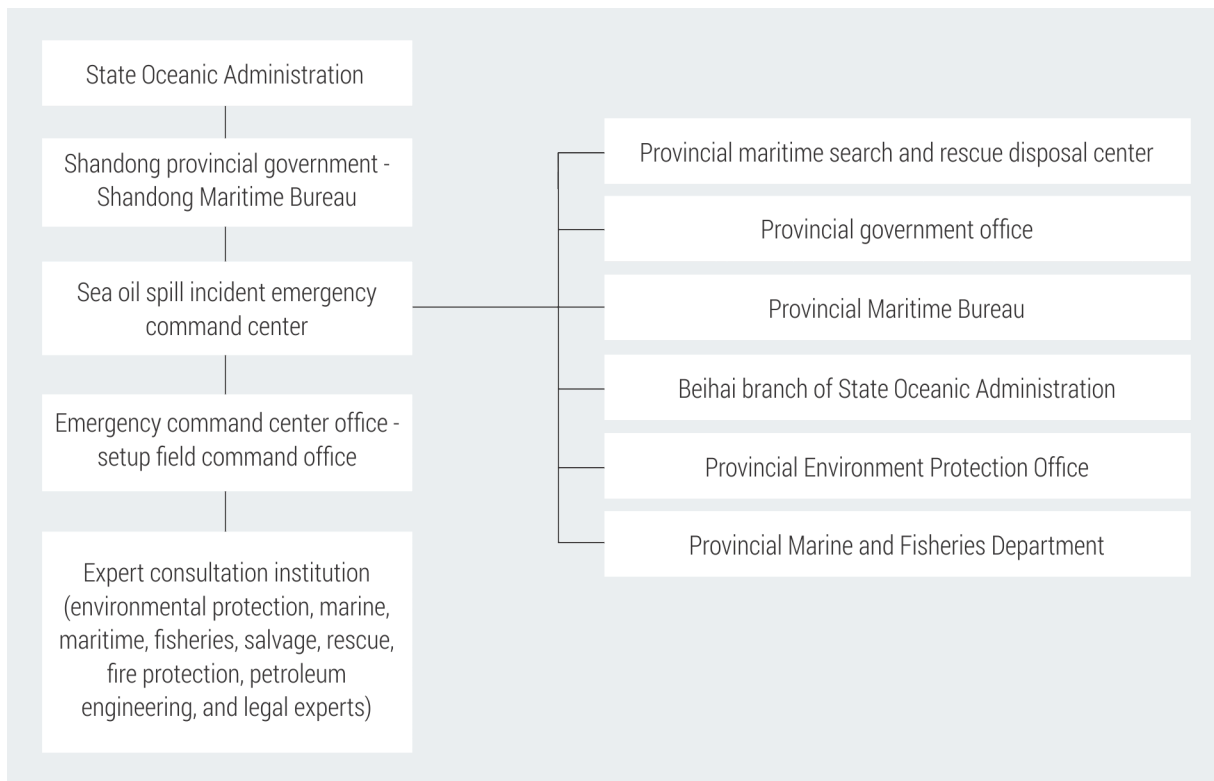
- 2. Complement the provincial efforts in the implementation of an oil spill emergency response plan.** In Shandong province, an emergency response plan for oil spills from oil and gas exploration was developed to ensure that the relevant agencies and personnel were able to execute a unified and coordinated response during oil spill incidents. The plan included oil spill emergency classification, organizational structure and responsibilities, procedures for prevention and activation of early warning strategies for emergency response, early warning support systems, news releases, subsequent disposal works, etc.

The Oil Spill Incident Emergency Command Center, headed by the provincial government, was responsible for the unified coordination of the emergency response operation during oil spill incidents (Figure 3). The director of the Maritime Search and Rescue Center held a concurrent post as director of the Emergency Command Center, while the deputy directors of the provincial government office, the Shandong Maritime Bureau, the Beihai Branch of SOA, the Provincial Environmental Protection Office, and the heads of the Marine and Fisheries Department held posts as deputy directors. Personnel—from all levels of emergency command, and port and stations of loading and unloading—were trained in emergency operations and issued the corresponding certificates.

The role of the city government was to be familiar with the provincial emergency response plan and, more importantly, to cooperate with relevant provincial authorities when oil spills occur within its administrative boundaries.

3. **Develop an oil spill emergency response plan at the city level.** Although major oil spill emergency response was usually managed by the provincial government, the Dongying City government prepared and released its marine oil spill emergency response plan and established the City Oil Spill Incident Emergency Command Center (COSIECC) (Box 1) for emergency response in cooperation with the Maritime Search and Rescue Center.

Figure 3. The Shandong Province oil spill response organization and command system.



Box 1. Responsibility of the Dongying City Oil Spill Incident Emergency Command Center.

The center was led by the provincial oil spill emergency command center and the city government. The center organized, coordinated, conducted, and commanded the emergency response to oil spill incidents at sea within its jurisdiction.

Specifically, the center was tasked with:

- Formulating the relevant rules and regulations relating to emergency response and preparing, revising, and managing the Dongying marine oil spill emergency response plan;
- Organizing the work conference of city sea oil spill emergency response and supervising and inspecting the implementation of relevant decisions;
- During oil spill incidents, organizing the implementation of the marine oil spill emergency response plan;
- In the event of a large oil spill incident, reporting the developing condition to the provincial government and activating the emergency response;
- When the oil spill spread to the jurisdiction of the neighboring city, issuing timely notifications to the concerned city offices and coordinating related matters; and
- Guiding the implementation of the oil spill emergency response plan of related departments and enterprises.

In the event of large oil spills, COSIECC would, based on the nature of the oil spill (pollution sources), inform the relevant professional departments, which would then establish a field command office in conjunction with the county and district governments and the Municipal Development Zone Management Committee. The office was provided with following responsibilities:

- a. Execute the order of COSIECC and determine and implement the detailed oil spill response plan;

- b. Collect relevant information on the oil spill incident and provide timely progress reports, including results of the emergency response to COSIECC;
- c. Organize teams to contain oil spills at the source; control the diffusion and expansion of spilled oil to other areas; remove and dispose the pollutant; and keep record of specific actions;
- d. Based on the field conditions, evaluate the efficiency of the oil spill disposal action and propose the next action scheme to COSIECC; and
- e. Ensure adequate communication for oil spill emergency response action and provide security and logistical support for field operation personnel.

4. Establish an expert consultative group.

To provide more professional support for maritime rescue and pollution disposal, an expert consultative group was established in June 2014, consisting of 19 representatives from various organizations in related fields of oil spill emergency response. The experts participated in marine pollution emergency response operations; researched on important issues relating to emergency response activities; and provided advice and recommendations for emergency command decisions and for dealing with the aftermath of accident.

5. Develop a compensation mechanism and impact assessment methodologies for valuation of impact of oil spills.

In June 2011, the Penglai 19-3 oilfield incident polluted an area of about 6,200 km² (nearly nine times the size of Singapore), including 870 km² severely polluted. The US energy giant Conoco Phillips China and its partner, the China National Offshore Oil Corp, agreed to pay RMB 1.68 billion (US\$ 267 million) for cleanup, environmental restoration, and protection

efforts. The experience from Penglai 19-3 oil spill incident provided a basis for the development of marine ecological impact assessment guidelines to assess damage from oil spills to the marine environment. The guidelines included penalty and compensation classified into three categories, namely: (1) administrative penalty; (2) compensation for marine ecology; and (3) compensation for fishery losses (Liu and Zhu, 2014).

6. Strengthen local oil spill monitoring capacity to promote prompt and fast response.

Oil spills have the potential for serious damage to the marine environment. Fast and accurate detection of oil spills are significant for disaster prevention and mitigation. In 2014, the Dongying City Ocean and Fishery Bureau (DOFB) developed a new marine integrated information system which focused on information processing and warning with upgraded video surveillance system composed of radar, AIS, GIS, buoys, and other relevant techniques (Zhang, et al., 2015). DOFB was also equipped with a multipurpose microwave radar automatic oil spill detection system. Radar monitoring stations were constructed in the estuary of Guangli River, the fishing harbor of Xiaodao River, the central fishing harbor of Hekou District, and the fishing harbor of Diaokou District. The radar detection system automatically obtained the location of the oil spill, range (contour and area), and positioning and carried out continuous tracking, which significantly improved the capability and response efforts.

7. Maintain good communication across all levels.

Communication programs, targeted at potential key stakeholder groups, such as aquaculture farmers, tourism sector, among others, were essential in order to

maintain effective working relationships and awareness in case of emergencies. Whenever a project involved sea areas, the Dongying City government convened a consultative meeting with stakeholders, and across levels of governments. For example, the National and Local Government People's Congress and the Chinese Political Consultative Conference, together with the Standing Committee, Dongying City, and Shengli Oilfield, formulated important policies and major projects for the oil cooperation program. Dongying City also set up a site office system and easy access system to coordinate and solve problems encountered in major project construction in Shengli Oilfield (Zhang, 2014).

8. Establish partnership arrangements with industries.

These arrangements in implementing communication and capacity development programs were important to reduce the negative impacts of oil spills, specifically economic loss to aquaculture. Recently, the Dongying City government and Shengli Oilfield established a coordination office to optimize the industrial use of petroleum and improve the ecological quality of the environment; thus, achieving a functional urban development.

Results

Leveraged support for environmental improvements

Dongying City mobilized resources from the petroleum industry to enhance its capacity in environmental management of petroleum exploration and production activities. The Shengli Oilfield spent about RMB 8 billion (US\$ 1.25 billion) to set up nearly 50 sewage treatment plants and 7 marine environment monitoring

stations in the river estuary and petroleum platform. Dongying City established a marine emergency center and a professional emergency rescue team equipped with an emergency vessel, special fire boats, booms, skimmers, and other facilities. Dongying City also improved the capacities of the marine oil spill emergency response center, the marine pollution early warning and emergency processing system, and the marine pollution monitoring center. The oil spill emergency response center was capable of effectively responding to a 3,000-ton oil spill. Dongying City constructed a maritime management information system and was able to establish a communication network from national to city levels.

Collaborative planning and cross-sector linkages

Contingency planning for oil spills from national to local levels (including company level) associated with offshore petroleum activities was supported by the existing national policy framework of PR China. Specifically, all offshore oil operators were required to develop oil spill contingency plans for their operations, including building capacity for oil spill response. For instance, the China National Offshore Oil Corporation (CNOOC) established the emergency planning information system to support its decisionmaking and response during oil spill incidents. Three levels of emergency response planning system were established: (1) crisis management plan at the head office; (2) contingency plans and special emergency plans at the branch office; and (3) emergency response plans at factories and work sites. Each level of the emergency response plan included a corresponding command center.

Industry responding to risks

An effective information management system is the key to an effective response. The CNOOC, together with the local government, established a high technology emergency information management system including personnel management system, 3D emergency information display platform, production facilities emergency database, oil spill simulation tracking system, and disaster weather early warning system, among others.

The CNOOC also invested RMB 500 million (US\$ 78 million) to establish an emergency response team—the CNOOC Oil Spill Environmental Service Corporation. All emergency personnel underwent international professional training and obtained internationally recognized qualification certificates.

Lessons Learned

A national policy framework on oil spill management facilitates the establishment of a system for oil spill preparedness and response at the city level. However, it is worthwhile for governments to consider the following:

- Additional measures such as better news releases, accurate damage assessment methods, and better claims and compensation channels to promote programs necessary for public involvement;
- Preparedness and emergency response planning to oil spills is most effective when established and connected at various levels: provincial, local, and industries;

- Provision of adequate resources for industrial and environmental safety training, training and emergency preparedness, availability of safety equipment, knowledge on evacuation procedures, and availability and effectiveness of rescue teams can have a positive influence on the overall impact of oil spill incidents when they occur; and
- New technologies for rapid and precise reconnaissance and sampling to support a timely and robust response effort, and to facilitate better integration of operational and scientific monitoring and data application in planning and implementation of preparedness and response efforts as well as compensation for damage.

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Protecting the Green Turtle through Integrated Coastal Management

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Key Message

- Efforts to conserve the green sea turtle and its habitat cannot be successful without strong political will from both national and local governments, stakeholders support (especially community), and technical and management capabilities as well as sustained financing over the long term.
- The application of ICM system in Sukabumi enabled the local government to put in place key governance elements which strengthened interagency

and stakeholder coordination and partnerships, reinforced legislation, created public awareness, built capacity, and mobilized community participation in its conservation program.

Abstract

Sukabumi is the only place along the southern coastline of West Java where sea turtles nest. Dominant in all nine nesting locations including Pangumbahan beach is the green turtle (*Chelonia*

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mydas). Recognized as the official symbol of Sukabumi Regency, the species' existence has been threatened by human activities including rampant turtle egg collection and unregulated invasion and utilization of its habitat by coastal tourism development and sand mining,

Previous private sector management of the beach under local government license allowed a proportion of collected eggs to be sold while the rest were hatched for release. However, scientific assessments indicated a large decline in turtle population.

The local government regained management in 2008, developing and implementing a turtle conservation program as part of Sukabumi's integrated coastal management (ICM) program. The national government, through the Ministry of Marine Affairs and Fisheries (MOMAF), declared Pangumbahan Beach as a conservation area and provided support for the establishment of a turtle conservation center.

The program ensured that all turtle eggs were allowed to hatch and the hatchlings released. An increase in the nesting population and number of eggs and hatchlings released relative to the private concession period was evident. Regulated ecotourism was permitted in the conservation area to promote education and awareness of turtle conservation and provide economic opportunities for local people.

The case study demonstrates the concerted efforts of the local and national governments and various stakeholders to put in place necessary governance mechanisms and actions using ICM approaches, to ensure that the green turtle, the natural heritage and symbol of Sukabumi Regency, remains protected.

Background

Sukabumi Regency is located in West Java province on the south coast of Java Island, about 120 km away from Jakarta, Indonesia's capital. It is a part of the rapidly growing economic region of Jakarta and surrounding cities and regencies.

Sukabumi Regency has a coastline of about 117 km and coastal area of about 136,485 ha, covering nine subdistricts. It has nine turtle nesting areas located in the Ciemas and Ciracap subdistricts, namely: Pangumbahan, Hujungan, Karang Dulang, Legon Matahiang, Citirem, Batu Handap, Cibulakan, Cebek, and Cikepuh. Eight sites are managed by the Natural Resources Conservation Unit of the Ministry of Environment and Forestry. One site, located in Pangumbahan, is managed by the Local Government of Sukabumi Regency.

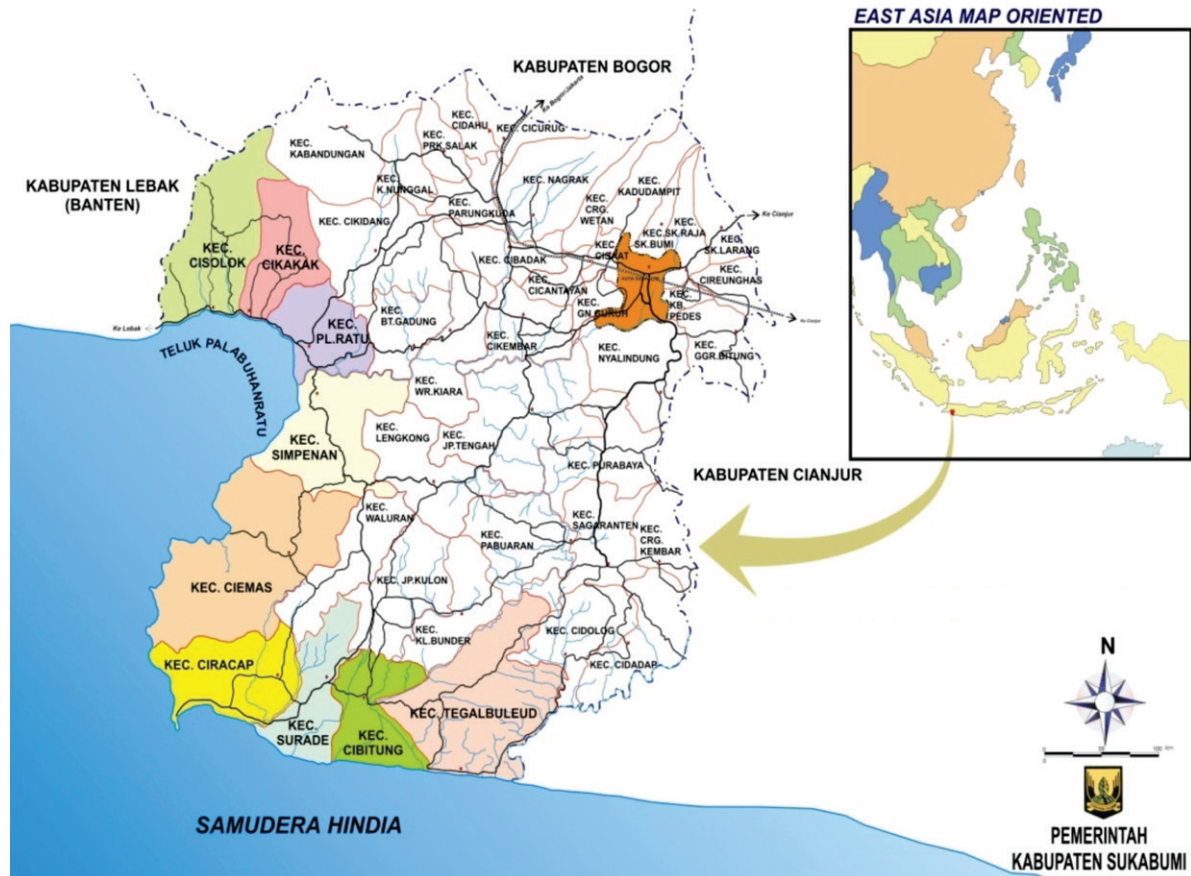
Indonesia has six species of turtles: starfruit turtle (*Dermochelys coriacea*), squama/shell turtle (*Eretmochelys imbricata*), fission/cracked turtle (*Lepidochelys olivacea*), crock turtle (*Caretta caretta*), flat turtle (*Natator depressus*), and green turtle (*Chelonia mydas*). The green turtle has become the dominant species in all turtle nesting areas of Sukabumi; it was recognized as the symbol of Sukabumi Regency and inscribed in the regency's official logo.

Pangumbahan Beach

Pangumbahan Beach is considered the most important green turtle nesting area along the coast of Java. It was officially listed by the International Union for Conservation of Nature (IUCN) in 2004 as one of three locations in Indonesia and among thirty other locations in the world considered as location index sites for green turtle population observation.

Pangumbahan Beach is located in Pangumbahan Village, Ciracap District, near the coastal tourism

Figure 1. Map of Sukabumi Regency (Kabupaten Sukabumi). The regency is located in the south coast of West Java Province bordered by Palabuhanratu Bay and Lebak Regency of Banten Province on the west, Bogor Regency and Cianjur Regency of West Java Province on the north and east respectively, and the Indian Ocean on the south. The regency is composed of 47 districts, 9 of which are located along the coast. (Source: Government of Sukabumi Regency).



area of Ujung Genteng, about 150 km from the city of Sukabumi (Figure 1).

Management issues and threats to sea turtle population in Pangumbahan

Some form of sea turtle management in Pangumbahan began as far back as 1907 under license from the Dutch Colonial Government, and in 1957, a “tender system” was implemented (Wiadnyana and Nastiti, 2013). From 1973 to 2008, a private company, CV Daya Bhakti,

signed a series of concession agreements with the local government of Sukabumi Regency and the provincial government of West Java for the management of turtles in the area (Table 1). From 1973 to 2001, the license issued to CV Daya Bhakti allowed the concession holder full authority to manage the harvest of turtle eggs for commercial purposes. From 2001 to 2005, the license specified that 30% of the turtle eggs should be allocated for conservation purposes (i.e., allowed to hatch), while 70% could be used by the concession holder. In the period 2005-

Table 1. Chronological development in management institutions of Pangumbahan Turtle Park (Sukabumi Fisheries and Marine Agency, 2013; Nastiti, et al., 2009, cited in Wiadnyana and Nastiti, 2013).

Period	Management institutions
1973-1979	CV. Daya Bakti licensed by Head of Sukabumi Regency
1980-1990	CV. Daya Bakti licensed by Head of Sukabumi Regency
1990-2001	CV. Daya Bakti licensed by West Java Governor
2001-2005	CV. Daya Bakti licensed by Head of Sukabumi Regency based on local legislation No. 2 (2001) regarding tax of swallow bird nest, seaweed and egg turtle (cancelled); 70% of turtle eggs used by concession holder and 30% used for conservation purposes
2005-2008	CV. Daya Bakti licensed based on local legislation No. 16 (2005) regarding the conservation of turtles (cancelled); 50% of turtle eggs used by concession holder and 50% used for conservation purposes
2008	MOMAF issued Regulation No.B-55/Men-KP/II/2008 (14 February 2008) on prohibition of turtle and body part utilization (100% of sea turtle eggs to be hatched)
2008 - present	<p>Pangumbahan and its surroundings established as a conservation zone with status as a coastal park by Decree of Sukabumi Regent No. 523 /Kep.639-Dislutkan/2008</p> <p>Local government of Sukabumi Regency takes over management of sea turtle conservation area based on Local Act No. 5 (2009) regarding sea turtle conservation (100% of sea turtle eggs to be hatched)</p> <p>Pangumbahan Turtle Park and Turtle Conservation Center was launched by MOMAF on 22 December 2009</p>

2008, the license required that at least 50% of the eggs should be allowed to hatch, but illegal collection of eggs continued.

Unregulated harvesting of eggs from nesting beaches was one of the most detrimental human threats to green turtles. Other threats were indiscriminate harvesting of adults such as nesting females, or drowning in fishnets, degradation and loss of coastal and marine habitats, increased pollution, and diseases (IUCN, 2004). These were common threats in Pangumbahan Beach (Hutabarat pers. comm., and Cruz, 2002, cited in IUCN, 2004).

Changes in the nesting habitat, including construction of buildings, beach protection facilities, sand nourishment and/or sand extraction, can also directly or indirectly contribute to decrease in the nesting area and modify natural nesting behavior of adults

and hatchlings (Lutcavage, et al., 1997 and Ackerman 1997, cited in IUCN, 2004). Coastal road development accompanied by artificial lighting also affects nesting behavior and can confuse hatchlings (Witherington and Bjorndal, 1990, and Witherington, 1992, cited in IUCN, 2004). In Sukabumi Regency, development of tourism facilities along the coastline, increased marine litter on the beach, marine pollution, sand mining, and port development were further worsening the situation.

Decline in sea turtle population

IUCN's analysis of published information showed extensive decline in green turtle population in all major ocean basins over the last three generations as a result of overexploitation of eggs and adult females at nesting beaches, juveniles and adults in foraging areas, and to a lesser extent, incidental

mortality relating to marine fisheries and degradation of marine and nesting habitats. At Pangumbahan in particular, a decline in green turtle egg harvest from 2,500,000 in the 1950s to 400,000 in the 1980s was recorded (Schulz, 1987, cited in IUCN, 2004). Based on this statistic and applying further analysis and assumptions on population trajectories, the past annual nesting female subpopulation three generations back (estimated at 128.4 years) was 8,333, while the present annual nesting female subpopulation size (in 2001) was estimated at 370, indicating a 96% decline.

Drivers for sea turtle conservation

Results of scientific assessments together with the promulgation of the National Act on Conservation of Natural Resources and Ecosystem (NA 5/1990) and the National Act on Preservation of Fauna and Flora (NA 7/1999), drew increasing recognition among local stakeholders to the decline in green turtle population and the various threats, particularly egg harvesting from nesting beaches by the mid-2000s. There were increasing calls from conservation groups, nongovernment organizations (NGO), academic institutions, relevant agencies, and communities within and outside Sukabumi to improve the protection of sea turtles and to put a stop to the practice of harvesting and trading of turtle eggs.

There was also increasing recognition that protection and conservation of the sea turtles and their habitat would need the coordinated efforts and actions among levels of governments and across various stakeholders at national and local levels. It would also require putting in place necessary governance and management measures to ensure the protection of sea turtles and their habitats while allowing complementary activities that contribute to local economic development.

On 24 February 2003, the government of Sukabumi Regency signed a Memorandum of

Agreement with the GEF/UNDP/IMO Regional Programme on Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) for the development of an ICM program, including establishment of an interagency and multisectoral ICM Program Coordinating Committee (PCC) and a Program Management Office (PMO) hosted by the Environmental Board of Sukabumi Regency. A long-term coastal strategy was developed and adopted as guide for undertaking integrated planning and harmonizing funding allocations across various sectors concerned with marine and coastal management.

The enactment of the National Act 27/2007 Concerning Management of Coastal Zones and Small Islands, and the issuance by MOMAF of Regulation No. B-55/Men-KP/II/2008 concerning prohibition of turtle and body part utilization (thus requiring use of 100% of turtle eggs for conservation purposes), provided further basis and guidance to the local government to undertake necessary steps to reduce threats and enhance protection of green turtles in Pangumbahan.

Approach and Methodology

In response to the above driving factors, as well as increasing awareness of marine and coastal conservation, and calls from various stakeholders, Sukabumi Regency initiated the development of a conservation program in 2008 to protect the sea turtles and their habitat in Pangumbahan. This began with the designation of Pangumbahan Beach and its surroundings as a conservation zone with the status of a coastal park by virtue of the Decree of Sukabumi Regent No. 523/Kep. 639-Dislutkan/2008. The conservation area has a coastline of about 2,300 m with a land area of about 115 ha and a sea area of about 1,566 ha.

This was followed by the issuance in 2009 of the Local Act No. 5/2009 regarding Sea Turtle

Figure 2. The launching of the Pangumbahan Turtle Conservation Center on 22 December 2009.



Conservation Area in Sukabumi to replace Local Act No. 16/2005. Local Act No. 5/2009, was promulgated to enable the local government to take over management of the sea turtle conservation area from the private sector, with consensus between CV Daya Bhakti and Sukabumi Regency Government. The regulation mandated the following:

- The sea turtle conservation area will be managed by the local government through the local Marine and Fisheries Agency;
- 100% of eggs hatched into young turtles (*tukik*) will be released into the sea; and
- Ecotourism activities will be developed in accordance with the coastal zoning system.

In support of the local initiatives and as part of the establishment of marine conservation areas under NA 27/2007, MOMAF declared the Pangumbahan Sea Turtle Conservation Area in December 2009 as a Small Islands and Coastal Conservation Area, and launched the development of the Pangumbahan Turtle Conservation Center (Figure 2). This facilitated the provision of funding from the central government to support the sea turtle conservation program in Pangumbahan coastal park.

In accordance with NA 27/2007, subsequent development and adoption of a Coastal Use Zoning Plan for Sukabumi Regency 2012-2032, through Local Act No. 22/2012, specified Pangumbahan as a sea turtle conservation zone.

Development of the Pangumbahan Coastal Park and Turtle Conservation Center

With funding support from the local and central governments, the development of the Pangumbahan Coastal Park and Turtle Conservation Center was implemented as follows:

- 1. Institutional development and capacity building.** A committee was established to lead the development of the Pangumbahan Turtle Conservation Center. A turtle conservation team composed of representatives from the local government and collaborating NGO was formed to serve as the core technical team. The team received training on the application of various techniques for turtle conservation and habitat protection.
- 2. Public socialization.** Intensive public awareness, education, and consultation activities were undertaken with the communities on the development of policies, legislations, and institutional mechanisms related to the development of the sea turtle conservation area, including the designation of common use and conservation areas.
- 3. Preparation of a master plan.** A master plan covering the Pangumbahan sea turtle conservation area was prepared, which identified zones for nature reserves, common recreational area, green belt, and conservation (Figure 3).
- 4. Establishment of infrastructure.** Necessary infrastructure for the Pangumbahan Turtle Conservation Center was put in place including the border fence, entry gate to the conservation zone, guard posts, the Turtle Information

Figure 3. Master plan of the Ujung Genteng - Pangumbahan Area located in Ciracap District. The plan specifies zones for nature reserves (zones 1 and 5), public recreation (zone 2), green belt (zone 3), and conservation (zone 4). (Source: Public Works Agency of Sukabumi Regency).

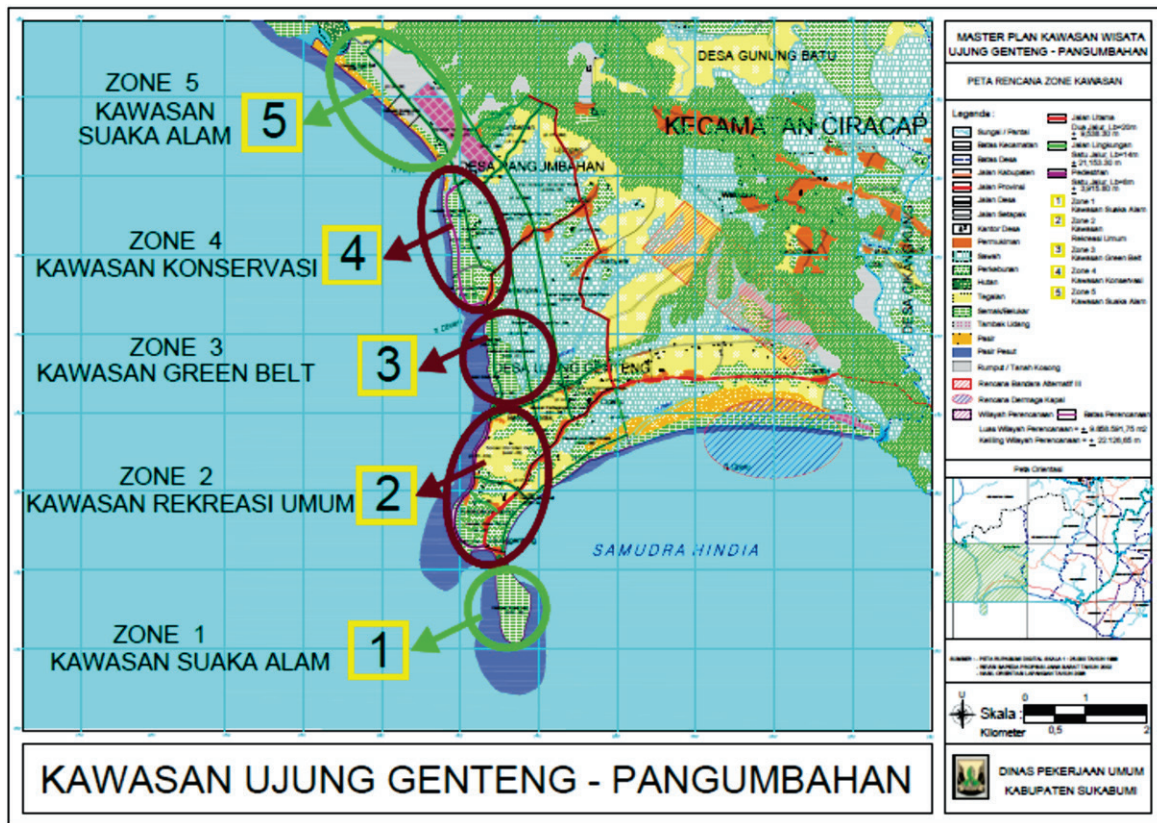


Figure 4. The Pangumbahan Turtle Conservation Center (L-R): entrance gate, information center, guard post.



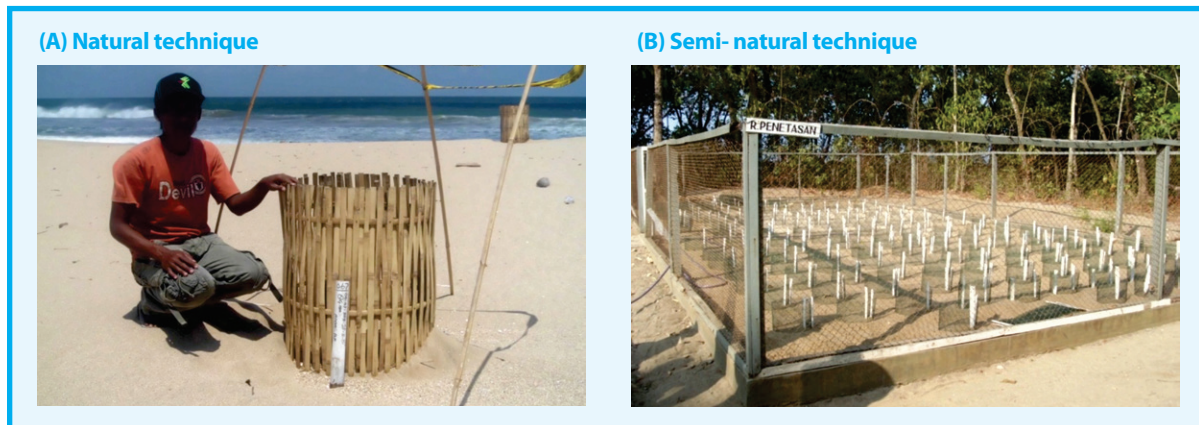
Center, nesting room, *tukik* caring room, employee dormitory, office and meeting hall, etc. (Figure 4).

For managing the turtle population, two techniques were applied – natural and semi-natural (Figure 5).

5. Management of the turtle and its habitat. As the green turtle is sensitive to disturbances, the program gave importance to the management of the turtle population and its habitat.

The natural technique involved having the turtle hatch by itself, without special treatment. The officers only put the label on the turtle's egg hatching place, and monitored and

Figure 5. Two techniques in managing turtle eggs.



protected it. When the eggs hatched, the young turtles were then released into the sea. The percentage of turtle eggs that hatch using this technique could reach 90%, however, operational costs were high as the eggs were very vulnerable to theft, interference, and predation by other animals.

For the semi-natural technique, the eggs were transferred to a hatchery. Hatcheries were located near the egg-laying areas. Officers labeled the egg hatching place and controlled and protected it. Hatchlings were then released into the sea. This technique provided increased isolation of eggs from disturbance, but with a lower hatching percentage (70%). This technique incurred less operational costs compared to the natural technique.

Monitoring of the sea turtle population included the number of nesting population, eggs, hatchlings, and the turtles released to the sea.

To protect the sea turtle habitat, a program to protect and restore coastal vegetation along the 2,300 m coastline of Pangumbahan and the 58.43 ha conservation area was implemented, in conjunction with mangrove restoration and coastal tree planting involving the local communities and other stakeholders.

6. Community empowerment. Programs on community empowerment were gradually implemented to encourage people to switch from being *penggemar* (turtle egg thief) to being turtle protectors (Figure 6) which included:

- Participation in the National Program for Community Empowerment (PNPM Mandiri) which provided support in developing alternative sources of livelihood;
- Involvement in mangrove planting, coral transplantation, and monitoring of coastal and marine resources, including sea turtles; and
- Provision of support in developing economic opportunities to support ecotourism development.

7. Partnerships with the private sector. To sustain the operation of the Pangumbahan Turtle Conservation Center, and leverage available funding from the local and central governments, partnerships were developed with the private sector, academe, and other institutions/organizations. Corporate social responsibility (CSR) programs of private sector partners were initiated to support community

Figure 6. Community empowerment programs include development of alternative sources of livelihood (left) and engaging local people in coastal conservation activities (right).



Figure 7. As part of the development of regulated ecotourism in the Pangumbahan conservation area, visitors could observe turtle egg-laying and release young turtles to the sea.



socialization and empowerment programs, community participation in conservation, improvement of facilities and infrastructure, and supporting sea turtle management through a turtle adoption program.

8. **Development of regulated ecotourism in the area.** One of the objectives of the master plan for the Pangumbahan conservation area was the development of regulated ecotourism in the area, whereby visitors were only allowed to do selected activities such as viewing of turtle egg-laying, visiting the turtle hatchery, and releasing young turtles to the sea (Figure 7). Visitors were also allowed to visit nearby Ujung Genteng Beach to see its beautiful scenery, do surfing and fishing, and enjoy the sunset. A master plan was prepared

for the development of the Ujung Genteng-Pangumbahan integrated tourism zone area.

Other facilities located near the Pangumbahan Turtle Conservation Center included cottages, surfing area, fishing areas, harbor, fishing port, market, palm-sugar factory, and a sunset view area.

Results

Full protection of turtle eggs

The immediate outcome of the management interventions undertaken in the Pangumbahan Turtle Conservation Center was the cessation of turtle eggs harvesting, except for conservation purposes.

Figure 8. Number of nesting population of green turtle in Pangumbahan Beach, Sukabumi Regency, from August 2008 – December 2013, showing the highest number in 2008 and an annual trend peaking in October each year (8a). Although the number of nesting population decreased after 2008, it is still higher than in the numbers prior to 2008 (8b). (Salamsyah, 2007, cited in Syamsuni, 2012; and Sukabumi Fisheries and Marine Agency, 2013).

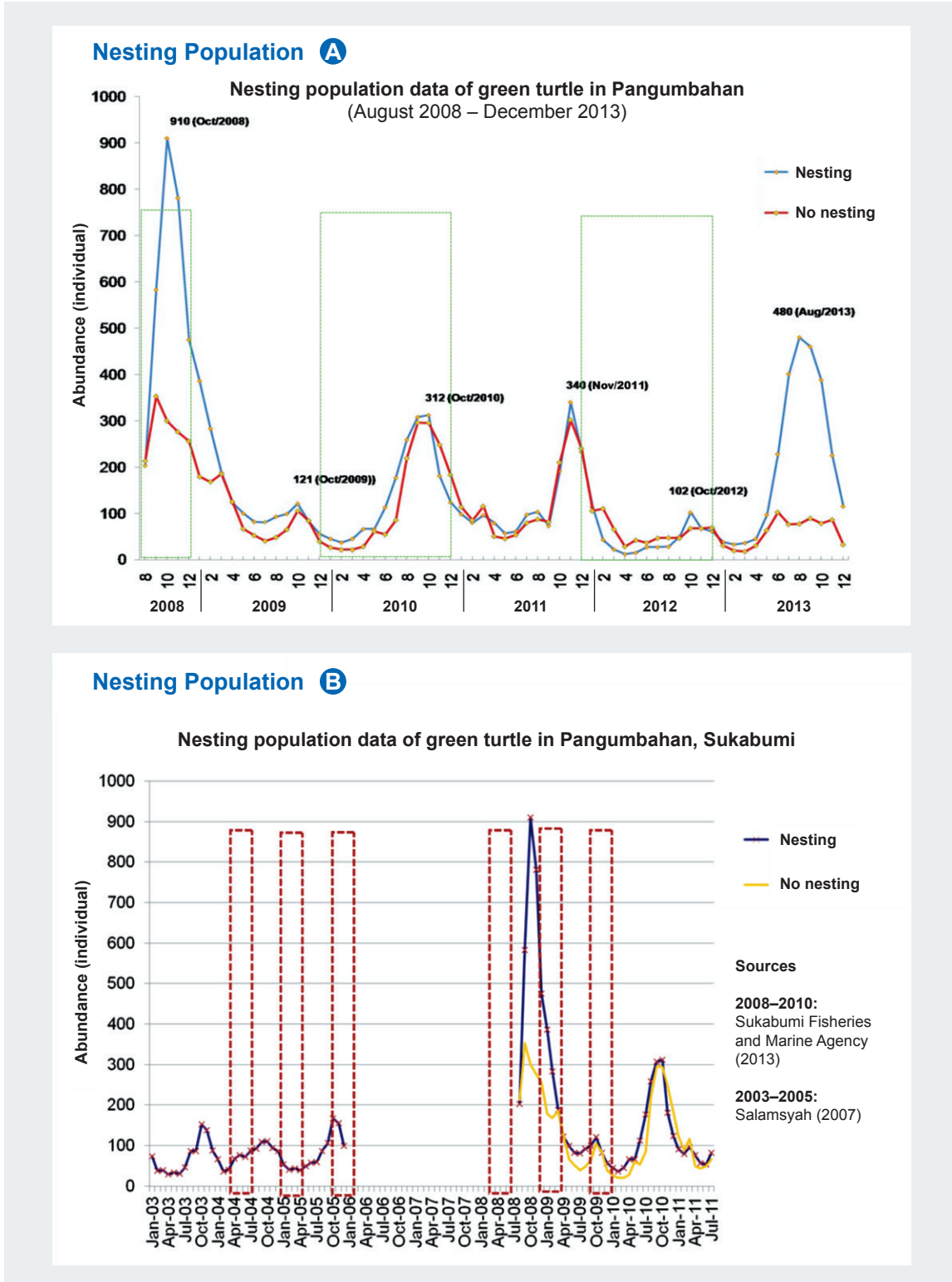
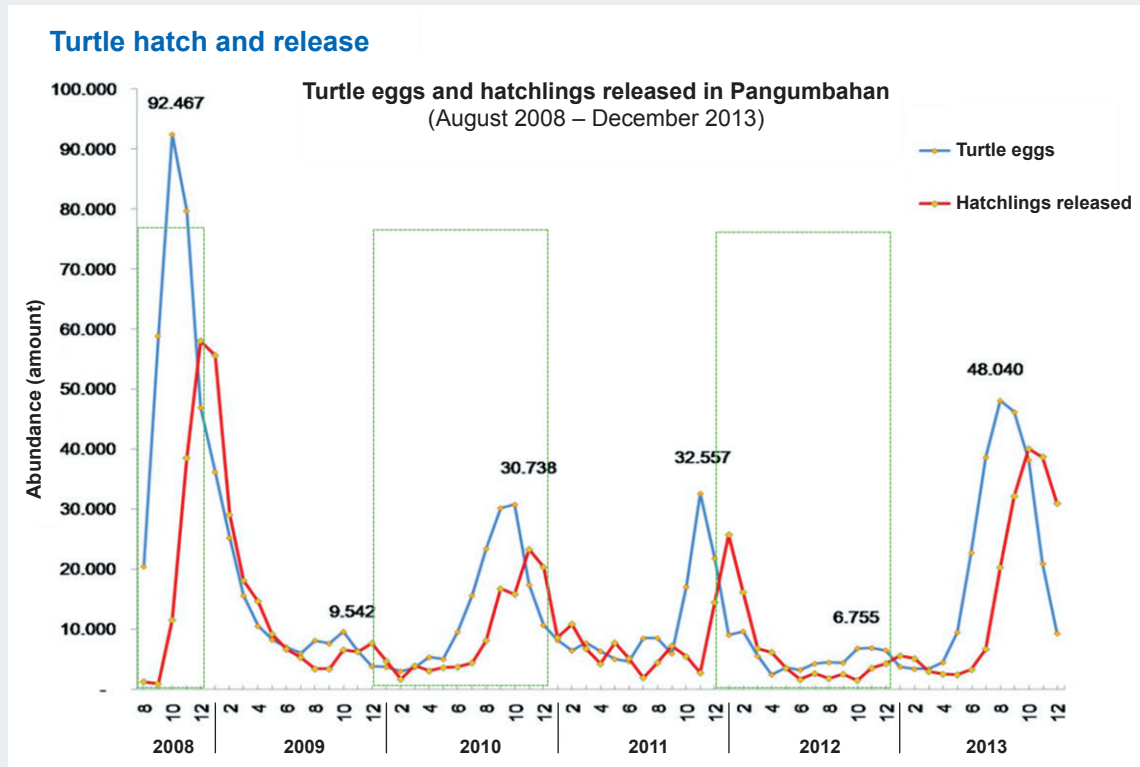


Figure 9. Data on turtle eggs collected and hatchlings released in Pangumbahan from August 2008 to December 2013, showing similar trend as the data on nesting population presented in Figure 8, with the highest numbers in 2008. (Sukabumi Fisheries and Marine Agency, 2013).



Improved monitoring and data collection

Monitoring and data collection were also improved since the local government took over the management of the conservation area. Monitoring data prior to August 2008 were incomplete.

Increase in nesting population, number of eggs, and number of hatchlings released

Available data from August 2008 showed a trend in the number of nesting population, which usually peaks in October of each year, and is low around April – June. The highest number of nesting population was recorded in 2008, with the number decreasing in succeeding years, though still higher than in the years prior to 2008 (Figures 8a and 8b).

Data on the number of eggs and hatchlings released to the sea showed a trend similar to the number of nesting population (Figure 9). Eggs collected were highest in 2008 at around 320,000, after which the number remained relatively stable at around 140,000 eggs in succeeding years (Wiadnyana and Nastiti, 2013).

Available data on the number of turtle eggs in the conservation area during the concession period in 2001–2007, showed a total of 549,693 over seven years. Under the management of the local government, the total number of eggs collected from August 2008 to 2011 was 749,000, exceeding the collection under the private concessionaire (Wiadnyana and Nastiti, 2013).

Similarly, the total number of hatchlings released in 2001-2007 was 19,864 individuals, while for 2008-2011, it was 479,300 individuals (Wiadnyana and Nastiti, 2013).

Other positive changes that occurred were:

- Improved management regime for the sea turtle conservation area and improved capacity of technical staff and stakeholders in protecting and managing the sea turtles and their habitat;
- Increased level of public awareness and participation in marine and coastal resources conservation and environmental protection;
- Increased knowledge and skills of local people on aquaculture practices and post-harvest processing technologies to produce local products even on a small scale as a home industry;
- Increased financial support/investments for sea turtle conservation from the local government, central government, private sector, and other partners;
- Increased number of visitors to the Pangumbahan conservation area, from less than 1,500 in 2008 to close to 22,000 in 2011. The area is also visited for research and scientific studies, marriage rituals of specific ethnic groups, and for media coverage; and
- Increased economic opportunities for the local government and communities related to ecotourism, including provision of transportation and other services and supplies to visitors.

Lessons Learned

The effort to conserve the sea turtle and its habitat cannot be successful without support from the government and all sectors. Key factors that have contributed to the establishment and operation of the sea turtle conservation area based on the experience in Pangumbahan are the following:

- Political support and commitment of the local chief executive (i.e., the regent of Sukabumi) and the support of the local parliament in establishing the institutional and legislative mechanisms to facilitate sea turtle conservation;
- Support of concerned national and local government agencies in developing and implementing the conservation program and providing basic services and infrastructure;
- Use of scientific inputs for consideration in planning and decisionmaking processes;
- Adequate public education, awareness, and participation in the various management processes; and
- Synergistic partnerships among government and private sector and other partners towards achieving common objectives.

The ICM concept and framework, and the process of putting in place the necessary governance elements can enable collaboration and convergence of efforts and resources across different agencies and sectors and facilitate stakeholder participation. This has been demonstrated in the development and implementation of the sea turtle conservation program in Sukabumi Regency.

One key challenge faced in the development of the sea turtle conservation area was the low awareness

of communities in the area on marine and coastal conservation and the impact of their practice of taking turtle eggs for consumption or sale.

To address this, intensive public awareness and education activities can be undertaken in collaboration with local community-based organizations. The communities can also be involved in and consulted during the various stages of program planning, implementation, and monitoring, including actual conduct of conservation activities such as mangrove and tree planting, etc. Law enforcement can be also strengthened leading to apprehension of individuals and establishments that were selling or utilizing sea turtle eggs and other body parts.

Within the ICM framework and using ICM approaches to stakeholder participation and consensus building in Sukabumi, the following governance elements were established:

- Policy, strategies and plans: Master Plan and Zoning Plan for the Pangumbahan Sea Turtle Conservation Area;
- Institutional arrangements: Turtle Conservation Centre and Turtle Conservation Team;
- Legislation: Local Acts issued by the local government in support of turtle conservation;
- Information and public awareness on turtle conservation;
- Financing mechanisms: support by local and national governments, private sector, and other partners; and
- Capacity development: technical training on turtle conservation and habitat protection.

In 2012, proposals by investors to build a sea port and undertake iron and sand mining in the area

were deemed as threats to sea turtle and their habitat. Consequently, a coalition of government agencies and local stakeholders, through their concerted actions, successfully prevented the issuance of permits/licenses to the investors.

Funding for the continuing maintenance and improvement of the sea turtle conservation area remain limited despite support from the central government. It is thus important to continue developing other sources of support and fund raising mechanisms through partnerships with other sectors including the development of limited ecotourism in the area.

Although the mechanisms and facilities to support sea turtle conservation in Pangumbahan are in place, it is recognized that continuing efforts from all stakeholders are still needed in order to sustain the conservation program.

The ICM experience and lessons learned in Sukabumi are expressed in the Sukabumi ICM program website:

“Integrated Coastal Management is not a one-for-all principle; it is a continuous and interactive process; it cannot be successfully implemented overnight and in fully integrated circumstances. The success of ICM program development and implementation is determined by the level of consciousness, awareness, commitment, consistency, capacity and confidence of authority/local government and other stakeholders as well as the presence of a common vision and clear objectives that can be shared by various stakeholders.”

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Innovative Coral Reef Restoration through Public and Private Sector Partnership in Chonburi, Thailand

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Key Message

- Marine and coastal conservation is not the sole responsibility of, nor should it be initiated only by, the government.
- The private sector, in collaboration with scientific research partners, can contribute significantly and, if properly facilitated, can attract more partners and volunteers.
- Support from the local government and adoption of participatory and collaborative approaches are important elements for facilitating participation of concerned line agencies and sectors, securing support and involvement from local stakeholders, and reducing potential use conflicts that may arise from marine conservation efforts.
- Incorporation of private sector-initiated conservation projects into the local government's integrated coastal management (ICM) program and/or

local government development plan is imperative to ensure the sustainability of the initiative.

Abstract

Coral reef condition in the Gulf of Thailand including Samaesarn subdistrict in Sattahip district, Chonburi Province, has deteriorated since the late 1990s, due to natural and anthropogenic factors. Consequently, coral transplantation was carried out from 1995 to 2001 and was shown to be cost-effective and safe using PVC pipes to support coral fragments for coral transplantation. Such approach was adopted by a PVC pipe company in 2003 as part of its corporate social responsibility (CSR) program.

In 2007, the company targeted to plant 80,000 coral fragments in commemoration of His Majesty, the King of Thailand's 80th birthday, with collaboration from various

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sectors of society. When Samaesarn Subdistrict Administrative Organization (SAO) became an integral part of the Chonburi ICM Program in the same year, it facilitated local arrangements for the establishment of a coral nursery, transplantation areas, and marine conservation camps in consultation with local communities using ICM approaches. These activities were incorporated as part of the local government's ICM Action Plan with annual budget allocation, including the local government's Raks Talay Samaesarn (Love Samaesarn Sea) Project.

Since then coral colonies increased and Samaesarn became a popular learning center for marine

conservation. The successes and social impacts have attracted the attention of other local governments, corporate partners, nongovernment organizations, and other stakeholders.

Background

Samaesarn is one of the eight subdistricts of Sattahip district, Chonburi Province, Thailand. It has a total area of 32 km², and a coastline of about 12.5 km (Figure 1). The total population in 2014 was 6,254. The area is under the authority of Samaesarn SAO, the local government unit, although some areas of the subdistrict are under

Figure 1. Location of Samaesarn subdistrict, Chonburi Province, Thailand: (a) Samaesarn subdistrict in the Gulf of Thailand; (b) administrative boundary of Samaesarn subdistrict; and (c) Luang Pho Dam Temple coast, site of coral restoration.

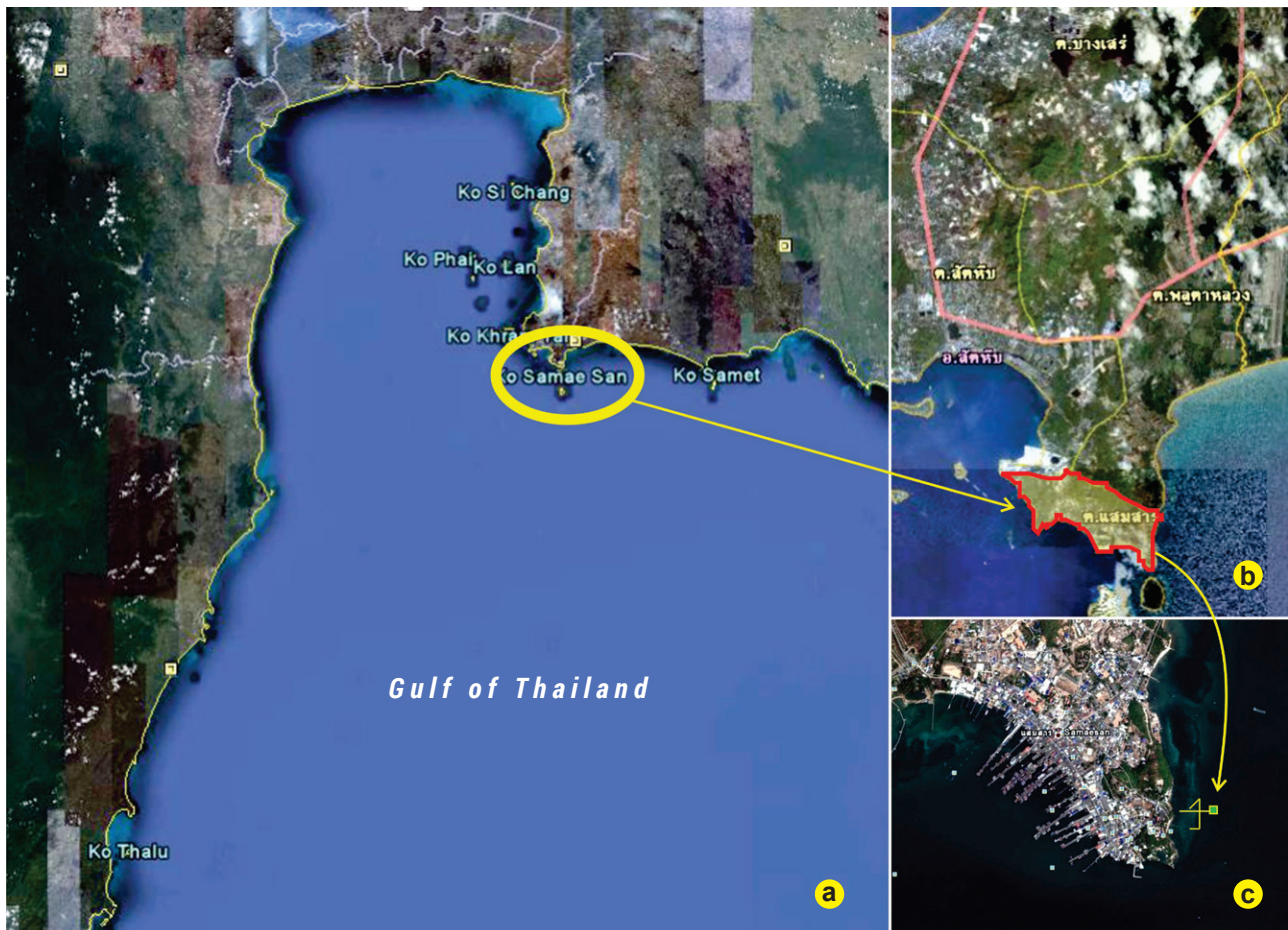


Figure 2. Bleaching of coral reefs at Samaesarn area in 2010.

the administrative authority of the Royal Thai Navy, particularly those designated for habitat conservation such as Koh Khram (Khram Island) and Koh Samaesarn (Samaesarn Island).

Coral reef management in Thailand rests on laws and regulations that apply to coral reef areas and marine protected areas. However, there is no designated marine national park in Chonburi Province despite it having a total coral reef area of 7.59 km² (UNEP, 2007).

Reefs in Sattahip district are among the important high biodiversity reef sites in the Gulf of Thailand. They support over 90 species of hard corals (33% live coral cover on average), and at least 40 species of algae, 29 species of sponges, 304 species of crustaceans, 134 species of echinoderms, 75 species of reef fishes, and 11 threatened species (UNEP, 2007).

A comprehensive national reef survey programme between 1995 and 1998 showed reef condition in the gulf to be variable (16% excellent, 29% good, 31% fair, 24% poor). Reef condition, however, worsened compared to the late 1980s. A bleaching event in 1998 also affected reefs in the gulf, killing

60–70% of live coral at Sattahip with *Acropora* being the most affected (Chou, 2000).

Coral reefs in the Sattahip area were moderately impacted by illegal and unregulated fishing, sedimentation associated with coastal development, land-based pollution, and natural events (storms and monsoons); and lightly impacted by tourism and recreation (UNEP, 2007). A coral bleaching event in 2010 contributed to further degradation of coral reefs in various areas of the gulf including Sattahip (Yeemin, et al., 2010; Figure 2).

In Samaesarn subdistrict, academic and scientific institutions, private sector, government agencies, local governments, and communities were cooperating in restoring damaged reefs since the mid-1990s (Vinythai PCL, n.d.). Such an initiative led to a successful demonstration of multi-agency and multisectoral cooperation in marine and coastal conservation, which received continuous public support and was also incorporated into the local development plan of Samaesarn subdistrict.

This case study showcases the efforts of a local educational institution in initiating coral

transplantation and subsequent cooperation and collaboration with a private corporation in expanding coral cultivation and conservation with multistakeholder participation.

Approach and Methodology

The Coral Reef Restoration Project

The approach and processes leading to coral transplantation, protection, and conservation in Samaesarn subdistrict of Chonburi Province are reflected through the following:

1. Scientific initiatives on coral cultivation;
2. Incorporation of coral cultivation as part of CSR of a private company;
3. Reinforcement of coral cultivation initiatives and scaling up by the company in collaboration with various agencies, institutions, and sectors including the Royal Navy;
4. Integration of coral cultivation and preservation into local government action plans through the ICM processes;
5. Using Samaesarn coast as a learning center for promoting marine conservation; and
6. Sharing experience and knowledge.

Scientific initiatives on coral cultivation

Reef degradation in various parts of Thailand inspired a team of researchers from the Rambhai Barni Rajabhat University (RBRU–Chantaburi Province) and Plutaluang Wittaya School in 1995 to identify possible ways of cultivating corals to support rehabilitation of coastal areas. Led by Mr. Prasarn Saengpaiboon, a lecturer at the Faculty of Science and Technology, RBRU, the

team evaluated different materials to use as a frame for an underwater coral nursery; and concluded that PVC pipes were the best choice: they can support coral propagation effectively; they are stable and safe for deployment underwater without causing adverse effects to other marine organisms; and they are the least expensive. In 1998, an experimental coral nursery was initiated in the coastal area of Samaesarn subdistrict, particularly in the Luang Pho Dam Temple coast in Village No. 3, an area with clear waters and numerous corals. Beginning with a test nursery of six PVC sections containing 138 corals, the nursery was increased to 500 cultured corals by 2001 (Vinythai PCL, n.d.).

The method used for coral transplantation involved (Khunprom, 2014; Figure 3):

1. Attaching a coral fragment on a PVC pipe using screws to hold them in place;
2. Placing the coral fragments (with PVC pipe as a base) into a square frame also made from PVC pipes, serving as the “nursery”;
3. Placing the PVC nurseries underwater and allowing the corals to grow for at least three years to become broodstock; and
4. Taking the nursery-grown corals and attaching them to rocks, dead corals, or other natural substrates, and leaving them to grow.

To reduce investment cost, the PVC pipes, being durable, were cleaned and reused for subsequent cultivation. The most commonly cultivated corals were staghorn corals (*Acropora* spp.) but other species such as *Pavona* spp. were also transplanted. (Figure 4).

In addition to the coral transplantation using PVC frames, other techniques were also applied including attaching coral fragments to a cement block (Marines Travel, 2014) or gluing to a hump coral (*Porites lutea*) with epoxy glue (Figure 5).

Figure 3. Coral transplantation: divers deploying the PVC coral nurseries on the sea floor (left); coral branches attached to PVC pipes (right).

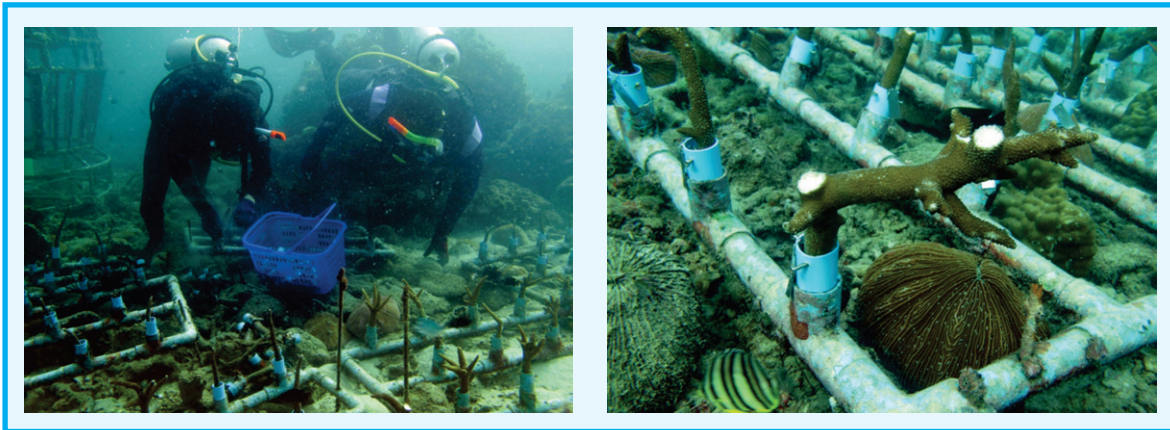


Figure 4. Corals growing on PVC pipes after 2–3 years.



Support by a private corporation as part of its CSR

In 2003, the coral cultivation initiative using PVC pipes came to the attention of Vinythai Public Company Limited (PCL), a company producing PVC pipes. Since the initiative was

in line with the company’s policy of supporting environmental conservation for sustainable development, discussions with the research team led to the establishment of a foundation, the Marine Science Activity and Conservation Foundation (MACF), in October 2003 to ensure

sustainability of the coral restoration initiative (Vinythai PCL, 2013). The foundation aimed to: (1) carry out conservation of marine and coastal resources; (2) help support activities of students, youth, faculty, scholars, and the general public, related to marine and natural resources; (3) educate students and the public about conservation, utilization, and management of natural resources and the marine environment; (4) coordinate volunteers, academics, and experts on marine science and conservation; (5) publish works on marine science and conservation; and (6) help other businesses regarding education, research, and conservation of natural resources and the marine environment. The foundation was chaired by Mr. Prasarn Saengpaiboon of Rambhai Barni Rajabhat University (Vinythai PCL, n.d.).

In 2003, the foundation committed to support the cultivation of 10,000 branches of coral fragments for transplantation with Vinythai PCL supplying the necessary PVC pipes (Khunprom, 2014). The project was undertaken in collaboration with local government departments, private businesses, the Royal Thai Navy, local residents, and fishing communities, and resulted in additional coral colonies as well

as increased awareness and cooperation on marine conservation among the participants.

Scaling up the target for a cause

The initial project was such a success that the foundation initiated a second phase in 2007 to commemorate the 80th birthday of His Majesty, King Bhumibol Adulyadej of Thailand, in honor of his leading role in environmental protection and natural resource conservation (ASEAN Vinyl Council, n.d.).

The project aimed to: (1) support collaboration among relevant organizations to cultivate corals in honor of His Majesty; (2) increase awareness on natural resource preservation especially corals; (3) disseminate knowledge on coral cultivation using PVC pipes; and (4) develop case studies for future replication and scaling up (ASEAN Vinyl Council, n.d.).

The main target of the second phase five-year project (2008–2013) was to cultivate 80,000 coral branches in five locations: Koh Samed, Rayong Province (10,000 branches); Koh Wai, Trad Province (10,000 branches); Koh Talu, Prachuap Khiri Khan (10,000 branches);

Figure 5. Other coral transplantation techniques: coral fragments attached to cement blocks (left), and other coral species attached to a PVC pipe then glued to *Porites lutea* (right).



Koh Kam, Chonburi (10,000 branches); and Samaesarn subdistrict, Sattahip, Chonburi (40,000 branches) (ASEAN Vinyl Council, n.d.; SCB, 2014). The project was extended to 2015 following the extensive coral bleaching in the gulf in 2010 (SCB, 2015).

The project was implemented through collaboration among Vinythai PCL; MACF; Department of Marine and Coastal Resources, Ministry of Natural Resources and Environment; Faculty of Science and Technology, Rambhai Barni Rajabhat University; First Naval Area Command, Royal Thai Navy; Samaesarn Subdistrict, Sattahip, Chonburi; Network of Koh Samed Conservation Community Organization; Koh Talu, Prachuap Khiri Khan; and the International Cultural and Educational Foundation (ICEF) (ASEAN Vinyl Council, n.d.).

The project was officially launched by Her Royal Highness (HRH) Princess Maha Chakri Sirindhorn in September 2008 at a ceremony where she prepared the first coral branch for the project (Pattaya Daily News, 2008).

Since 2008, Vinythai PCL provided a total of 1.4 million Baht (US\$ 40,000) annually to the MACF to support the coral reef restoration project, including provision of PVC pipes and supporting personnel. Every three years, the grown corals were removed for transplantation and their survival rates evaluated.

As the target of planting 80,000 coral branches in five locations was not fully achieved by 2015 due to the extreme damage from coral bleaching in 2010, the project was further extended to November 2016. A survey conducted in January 2011 showed that 32–63% of corals in three islands in Samaesarn perished from bleaching in 2010 (DMCR, 2011).

Integration of coral cultivation and conservation into the local development plan of Samaesarn SAO

Initially, the coral conservation project was implemented by MACF without the participation of villagers, and limited coordination with responsible agencies and the local government. In 2006, conflicts between coral growers and some members of the local community occurred over the growing of corals and the use of land along Luang Pho Dam Temple coast. The mayor of Samaesarn SAO intervened by inviting the head of the foundation and community representatives, including the subdistrict chief, village chief, and some local residents, to a meeting to resolve the conflicts. The meeting came to an agreement that MACF could expand its work in the Luang Pho Dam Temple area not only to implement the coral transplantation and conservation project but also to support the development of ecotourism to benefit the local community. In addition, it was agreed to use Samaesarn coast as an area for marine science learning and public education in collaboration with appropriate committees composed of representatives from concerned stakeholders.

Samaesarn SAO continued to facilitate the implementation of the coral transplantation and conservation project in Luang Pho Dam Temple coast by ensuring due consultation with the affected local stakeholders especially with the fishers who were unable to fish in the area. Communities were made aware of the benefits of coral reef restoration in improving fishery resources and facilitating future tourism development.

When Samaesarn SAO became a member of the Chonburi ICM project in 2007, it adopted and committed to implement the long-term coastal strategy for Chonburi. The Provincial Coastal

Strategy provided a shared vision and specific action plans for concerned local governments. As part of the ICM project, Samaesarn SAO developed a three-year ICM Action Plan (for 2008-2011), including coral reef restoration. In line with the ICM approach, the ICM Action Plan was incorporated into the SAO's annual development plan (specifically under the marine resources development plan) with allocated budget for implementation.

Following the incorporation of the ICM Action Plan in the local development plan of Samaesarn SAO, a project called Raks Talay Samaesarn (Love Samaesarn Sea) was launched. The project covered coral restoration along the Samaesarn coastal area, and expansion of the coral nursery in Luang Pho Temple Dam coast to supply corals to nearby coastal areas and islands. The project started in 2009 with a 20,000 Baht (US\$ 600) allocation for the period from 2009–2011 to facilitate multisectoral participation in coral restoration along the Samaesarn coastal area. The budget allocation was increased annually, reaching close to 100,000 Baht (US\$ 3,000) by 2016.

Under the Raks Talay Samaesarn Project, coral transplantation was organized at least twice a year, to celebrate the birthday of Her Majesty The Queen on August 12 and His Majesty The King's birthday on December 5. Community leaders, villagers, and students, together with local government leaders, officials and staff, government agencies, public enterprises, private companies, universities, and schools that have participated in earlier coral transplantation at Luang Pho Dam Temple, and a volunteer diver's association took part in the coral transplantation events. For example, on 5 December 2014, a total of 795 participants representing 12 organizations registered for the event. They were able to plant 87 coral branches (the age of His Majesty the King at that time), and released

100 sea turtles, planted 100 trees, and conducted coastal and underwater cleanup. Under the Raks Talay Samaesarn Project, release of fish fingerlings and other conservation activities involving tourists were also initiated.

Developing Samaesarn coast as a learning center for marine conservation

A marine science and conservation camp was established at the Luang Pho Dam Temple coast through the collaboration of Samaesarn SAO, MACF, and various partners. The camp conducted an education program on marine conservation for students, tourists, and volunteers from various sectors. Visitors could attend seminars on coral reef conservation, coral cultivation technique, use of diving/snorkeling equipment, and practical guidance on underwater deployment of coral fragments for cultivation (Figures 6 and 7).

The marine science and conservation camp was an open classroom and laboratory for students and young people in Samaesarn and other areas in Thailand. It provided:

1. Scientific initiatives on coral cultivation. Local schools, universities and learning institutions used the camp as a venue to teach students about natural resource conservation and environmental protection (Kennedy-Lugar-YES, 2011; Chan, 2013). Some schools incorporated marine conservation in their curriculum and use the camp as a venue for the students to see and gain hands-on experience on marine conservation. About 1,000–1,500 students from various schools and universities participated in the youth camp per month (Saengpaiboon, 2014).
2. A platform for private sector participation. The coral restoration project also provided a platform for the business/corporate sector

Figure 6. Activities held at a marine science and conservation camp in Luang Pho Dam Temple coast: (a) Visitors in the camp, usually students, attending a seminar on coral reef conservation and restoration; (b) They are training on floating at the sea using a life vest and the appropriate use of a snorkel. They practice with trainers for two hours to ensure their safety; (c) They are then guided by trainers to snorkel and view the corals while holding on to a rope; and (d) Students who do not pass the training or have an emergency during the training cannot snorkel in the sea. These students view the corals aboard a glass-bottom boat.



Figure 7. Activities in the deployment of coral fragments: Visitors in the camp are taught on a raft at sea to cut and attach coral branches to a PVC pipe (left), and set the grafted corals into a rectangular PVC frame for underwater deployment (right).



to contribute to marine conservation efforts as part of their respective CSR programs. In support of Vinythai's coral restoration project and/or the Rak Talay Samaesarn Project of Samaesarn SAO, many corporations, industries, banks, and other private entities participated in coral restoration in the marine science and conservation camp and other coastal areas in Samaesarn. Some private companies used it as a venue for their annual team-building activities (SCB, 2014, 2015). Even alumni organizations celebrated their reunions through participation in coral restoration (Kennedy-Lugar-YES, 2011).

As Vinythai PCL is a joint venture between Belgium-based Solvay Group, Charoen Phokphand Group and PTT Global Chemical, in 2013, HRH Princess Mathilde of Belgium visited Chonburi's Sattahip District to see the coral conservation project. The Princess was guided to attach a coral fragment to a PVC pipe, which was placed in a nursery in the coast of Samaesarn, near the first coral fragment prepared by HRH Princess Maha Chakri Sirindhorn in 2008 (The Nation, 2013).

3. A platform for community education and engagement. The coral restoration project also provided a platform for increasing awareness and participation of local communities in marine conservation through their involvement in coastal and coral conservation activities to honor the King and Queen.

Sharing conservation experience and knowledge with a wider audience

The coral restoration activities were sometimes covered by the media or extensively shared by the participants through their websites and various social media platforms. This helped to widely promote the coral restoration project in Samaesarn and further attracted visitors to the area.

Vinythai printed an information resource book about coral reef conservation in Thai and English. The book shares the objective of the project and included its activities such as, the coral nursery in Luang Pho Dam Temple, the target of transplanting 80,000 coral branches, the methodology for transplantation with PVC pipe, participation from various organizations, a picture of HRH Princess Maha Chakri Sirindhorn planting the first coral branch, and a picture of Princess Mathilde of Belgium visiting the area and planting a coral branch at Luang Pho Dam Temple.

Results

As of July 2016, around 41,000 branches of corals were cultivated and growing well in coral restoration areas in Samaesarn. Local fishers observed an increase in the diversity of fish species caught near the coral conservation areas. There were no systematic studies on the ecological impacts of the coral conservation project, but the ecological benefits in terms of coral restoration in Samaesarn were widely acknowledged by the communities.

The marine science and conservation camp in Luang Pho Dam Temple was regarded as a learning center where interested people could learn about marine ecosystems and their protection, conservation, and restoration. The nursery was serving as a source of corals for transplantation to various areas in Thailand.

Community awareness about marine conservation increased while thousands of participants in coral restoration and other marine conservation initiatives contributed to increasing advocacy for environmental protection and natural resource conservation in Chonburi Province and the country at large.

There was an apparent increase in the number of visitors to Samaesarn and the coral conservation areas. There was also an improvement in tourist facilities, and an increase in tourism-related services, such as dive suit rentals, dive courses, restaurants, gift shops and other coastal tourism enterprises. This translated to increased livelihood and job opportunities, and increased income for local people. There was no systematic data collection on tourist arrivals and increased incomes of local fishers and business owners. But based on interviews with shop owners, tourist arrivals were reported to have increased at least threefold in 2014 compared to 2009 when the coral conservation project was just starting.

With the success of the coral restoration project, Samaesarn was regarded as a venue for various sectors to collaborate and contribute to marine conservation.

The local government's capacity for marine and coastal protection and conservation and the application of the ICM approach and processes were obviously improved over the years. Coral conservation and other ICM program activities were integrated into the local government's annual development plan, with regular and increasing budget allocation.

Lessons Learned

Sustaining conservation efforts demand capacity building and stronger public-private partnerships. The coral restoration project in Samaesarn Subdistrict fully demonstrated that a nongovernment organization and private sector can make significant contributions and impacts in habitat restoration in partnership with local communities, academic institutions, and the local government. However, its sustainability can require greater efforts to: (a) mainstream

into the local government long-term action plans with the appropriate budgetary commitments; (b) strengthen partnership between local government and concerned stakeholders in the protection and management of the coral nursery and cultivation areas especially in harmonizing use conflicts arising from fishing, vessel traffics, and increased tourist activities as well as effective control of waste dumping in the coastal area; and (c) continue monitoring of ecological, social, and economic impacts of coral rehabilitation.

A local chief executive facilitates dialogue and cooperation and can effectively resolve conflicts. The local government, especially the mayor, can play an important role in resolving conflicts between the affected communities, such as the fishers; and in coral rehabilitation activities, by facilitating dialogues and cooperation of the stakeholders. This was demonstrated in the case of initial conflicts at the Luang Pho Dam Temple coast.

Coral rehabilitation can be promoted as a noble objective in protecting wildlife and the environment. This can be linked to the Buddhist teachings and practice of releasing fish and turtles to their natural environment. The endorsement of the coral transplantation project by the much revered Royal Family promoted wider support and greater contributions from all sectors of society. By setting coral transplantation targets to celebrate the King and Queen's birthdays, the project was able to mobilize greater investments in human and financial resources.

Initial successes can be leveraged to scale up conservation efforts. The adoption of the ICM approach in Chonburi Province enabled Samaesarn SAO to incorporate the coral rehabilitation project as part of the ICM program and facilitated the scaling up of conservation efforts to other coastal areas in the province and the country at large.

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Coral Restoration and Conservation in Serangan Island, Denpasar City, Bali, Indonesia: Turning Coral Miners into Conservation Advocates

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Key Message

- A strong motivation to effect change can come from any segment of the community, in this case, the youth.
- Local champions are crucial for raising community awareness and providing the leadership for community empowerment. The ICM system can capitalize on such willingness and facilitate support from all levels of government, nongovernment organizations, private sector, and the community by developing a network that harmonizes the needs of all stakeholders in an integrated manner.
- Community empowerment for sustainable environmental management can be achieved by the development of sustainable business opportunities in line with environmental conservation objectives.

Abstract

Bali's Serangan Island increased in size almost five times by land reclamation in the mid-1990s. Meant to support tourism development, which was later abandoned, the reclamation destroyed much of the marine habitats and valuable fishing grounds. The declining marine stocks forced many of the fishers to engage in destructive fishing and coral mining, earning them the reputation of reef "destroyers". In 2003, a group of young coral miners, highly motivated to protect coral reefs after learning of reef conservation from environmental campaigns, organized themselves into the "Coastal Fishers Group of Karya Segara". However, their expertise, capacity, or facilities to effect change were inadequate.

The Bali ICM Program selected Serangan Island as a site to demonstrate ICM approaches for addressing priority local issues and needs and to empower the community.

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The ICM program facilitated the development of the fishers group by building a network of partners to sustain their conservation effort and develop ecotourism services in collaboration with tourism agencies. This complete turnaround saw the transformation of some community fishers from being reef destroyers to active conservation advocates. Their strong conviction on environmental conservation and leadership earned them the respect of the community and in 2011, recognition from the country when they received Indonesia's highest award for environmental management programs.

Background

Serangan Island is a small island in Bali's Benoa Bay, close to three famous tourist destinations – Sanur, Kuta, and Nusa Dua.

The diverse marine habitats included mangroves, seagrass, coral reefs, seaweed beds, and tidal flats that provided abundant resources on which the community of mainly fishers depended. Seaweed (*Hypnea* spp. and *Gracillaria* spp.) and rabbit fish (*Siganus* spp.) were abundant in the seagrass habitat. Shellfish including shrimps and crabs were

readily available from the mangroves and wide tidal flats, while the coral reefs provided a diversity of high value target and ornamental fishes. The natural habitats and rich marine life attracted tourists from Sanur using traditional boats.

A reclamation project from 1994 to 1997 increased the island's size from 101 ha to 481 ha and connected the island to the mainland with a 110 m bridge (Figure 1). Intended for tourism development, which failed to materialize, the reclamation instead destroyed much of the island's natural marine habitats including natural nesting sites of the green turtle. The island is also commonly referred to as "Turtle Island".

Environmental conditions changed after the reclamation. Marine excavation and dredging destroyed the marine life and habitats, causing more than 75% of the seagrass beds and 50% of mangroves to disappear. Coral reef communities of adjacent areas that were not directly dredged were also affected because of their sensitivity to both suspended and settled sediment spreading from the reclaimed sites. The effects were long lasting. In 2002, a monitoring survey of the state of the coral reefs showed that mortality rate of Serangan's coral reefs was at 37.9% (Environmental Management Agency of Denpasar Municipality, 2002).

Figure 1. Serangan Island before (left) and after reclamation (right). The reclamation increased the size of the island by almost five times.



Before the reclamation, the majority of Serangan's population were fishers. The island was known as a fisherman's village in the Denpasar Municipality. Maritime tradition in the community was strong, brought about by the interaction with the Bugis ethnic population who came from South Sulawesi.

The local economy in the community was highly dependent on the coastal resources such that the level of welfare was determined by the reserves and the quality of the resources available, which can be accessed and utilized by the community. The increasing depletion of fishery resources in the coastal waters after the reclamation brought changes to the sources of livelihood in the island.

Habitat degradation posed a challenge to the fishing community as it did not have the knowledge or skill to fish in deeper waters of the open sea. The island's shallow coastal waters provided adequate resources for generations, but with the loss of habitat, the fishers lost their fishing grounds. The decline of living coastal resources forced some of the already poor fishers to engage in cyanide fishing and coral mining. Beautiful live coral colonies were harvested from the reefs and sold as ornaments for aquariums. Stony corals including large coral boulders were excavated and used as building materials. The income derived from these illegal and harmful activities was not huge but there were limited alternatives for the fishers.

As the economic situation of the people and the environmental conditions of the habitats worsened many fishers were forced to engage in destructive fishing. They gained the reputation of coral reef "destroyers" and were consequently barred from fishing in the neighboring areas of Sanur and Nusa Dua. The community as a whole had to bear the shame of being ostracized.

Approach and Methodology

A group of 42 young coral miners representing the youth of Serangan decided to turn things around, motivated by a desire to change the bad image of the island and its people.

Their awareness on the importance of preserving the environment was a result of their interaction with external parties and campaigns on the conservation of coral reefs in Bali. They learned that there were ways to utilize environmental resources in accordance with the principles of conservation that would provide alternative sources of income over the long term.

They launched the Coastal Fishermen Group of Karya Segara (CFGKS) in 2003 and pledged to restore the coral reefs and instill mindfulness towards the environment. They had the conviction, but their knowledge, capacity, and facilities to effect change were inadequate.

It was timely that their community initiatives in preserving coral reefs were welcomed by the Environment Agency of Bali. In 2004, through the Bali ICM Demonstration Site Project, a joint program with PEMSEA, Serangan Island was selected as a pilot project in the application of the ICM approach. The objective of the program was to increase awareness of the broader community on the importance of conserving coral reefs and developing alternative livelihoods. Capacity building activities and development of skills, along with training on restoration and conservation of coral reefs, were implemented by the program. To strengthen the program, the community group mobilized support from other parties, including the Ministry of Marine Affairs and Fisheries (MOMAF), the Government of Denpasar Municipality, the private sector, and nongovernment organizations (NGO). All of these were facilitated by the ICM approach.



Figure 2. Coral restoration and protection in Serangan Island. Clockwise from top left: coral cuttings attached to concrete substrate; coral cuttings ready for transplantation; corals transplanted in artificial reefs; and growth of transplanted corals.

Coral reefs take a long time to recolonize naturally but recovery can be accelerated through coral transplantation techniques (Figure 2). All coral species can be transplanted similar to assisted vegetative propagation. Under intensive maintenance, transplantation of corals can effectively restore and rehabilitate reefs. Restoration and rehabilitation efforts, however, cannot succeed without the active participation of people. Thus, restoration activities in the Serangan Island were complemented with conservation efforts. CFGKS became a motivating force in the practice of conservation in the island. Apart from stopping destructive activities, the group restored coral reefs in two hectares of the dredged area.

Starting in 2008, the restoration of coral reefs was used to engage tourists in a coral adoption program. Tourists participated in transplanting corals, an activity that became an attraction in the island along with other recreational activities such as swimming or snorkeling. Each tourist was charged a fee for each cutting of coral that she/he transplants, with the fee going to the host community. Experience showed that by participating in the program, tourists were able to identify themselves as part of the community; were proud to be counted as reef protectors and

conservationists; and enjoyed benefits derived from the unique and valuable experience of their visit to the island. In 2011, the group began to work with travel agents to bring more tourists to the island, thus contributing to the increasing revenues generated by ecotourism (Figure 3).

By 2008, the CFGKS achieved economic independence through activities and programs for restoration and conservation of coral reefs by developing ecotourism and by providing services in setting up and running projects in other regions in Indonesia. Some members of the group were able to get benefits from improved employment on account of the skills they learned from the Bali ICM project.

Serangan Island became a place of learning for many local governments, NGO, community groups, and students from universities within and outside Indonesia (Figure 4).

The CFGKS generated income by providing food, lodging, and services to visiting organizations and individuals. The Bali ICM program helped the group by promoting the island as a place to learn the methodology and practice of ICM.



Figure 3. A pontoon built with the support of private sector partners and operated by the Coastal Fishers Group of Karya Segara where tourists learn about marine conservation, at the same time choose tour packages that include transplanting corals, releasing seahorses, diving, and snorkeling. The seahorses come from the culture farm of the community group.



Figure 4. Mr. Wayan Patut (extreme left), Head of the Coastal Fishers Group of Karya Segara explaining the coral restoration method to visitors from Timor-Leste (August 2015).

In recognition of the efforts and achievements of CFGKS in conserving and saving coral reefs, then President Susilo Bambang Yudoyono of the Republic of Indonesia awarded the “Kalpataru” to the group in 2011, the highest award for environmental management programs. The award boosted the spirit of the group members and the community of Serangan Island to further push forward coral reef conservation.

Results

A major achievement of the Bali ICM pilot project was behavior change among the people of Serangan Island – from being destroyers of the environment to saviors of the sea. The willingness to change sprung from the community itself, from the ranks of its youth. The change was not forced on the community from above, i.e., government or outside forces.

The Bali ICM program, in this case, took the role of providing approaches and methodologies in dealing with the problems in Serangan Island using a holistic and integrated approach. These ICM principles served as guidelines in project implementation where, for example, the environmental, social, and economic problems were viewed as integrated elements of

a whole. The capacities and resources of the community, agencies, and other stakeholders to address the problems were facilitated through a collaborative management approach.

Community empowerment was and remains the core in achieving positive change, and in Serangan Island, it was strongly supported by the motivators – the young pioneers who encouraged other youth with their initiative. They demonstrated leadership and were trusted members of the organization and the community. The role of the motivators was to guide, inspire, and mobilize the community.

The program gave priority to campaigns that raised awareness through the use of media. These were followed by educational forums supported by the local government, universities, and NGO. The content of the message in the campaigns and educational activities was adapted to the level of knowledge and sociocultural characteristics of the fisher community. The main topics of the campaigns focused on:

1. the ecological processes in an ecosystem; the implications of resource use activities on ecosystems; and the negative effects that result from harmful human activities on the coral reefs; and
2. the functions of the coral reef ecosystem (physical, ecological, and socioeconomic aspects), and the importance of conservation efforts to reduce pressure and damage in order to maintain the functions of the coral reef ecosystem and use the resources in a sustainable manner.

Several sustainable livelihood training programs were also conducted covering: (1) life skills, such as diving, salvage, and underwater construction; (2) environment-friendly fishing and ornamental fish handling; and (3) reef restoration, such as construction of artificial reefs, coral transplantation, and coral reef monitoring.

Economic empowerment for the community was also implemented. In the short term, the alternative sources of income were provided through: (1) improving market access for fish catch that used eco-friendly methods, transplanted soft corals, and artificial rocks for tropical aquariums; and (2) providing job opportunities in maritime services for individuals with skills in underwater works and construction.

The medium-term alternative sources of income were expanded by building networks with local governments in and outside of Bali, and with private sectors. The organization capitalized on the new knowledge, skills, and experiences of the members. It received many requests from local governments and the private sector to work on the rehabilitation of coral reefs in different areas in Indonesia. It established partnership with the private sector such as the PT Bali Tourism Development Center (BTDC), Nusa Dua and PT Indonesia Power, through their corporate social responsibility programs. From these efforts, the organization was able to raise funds for its coral reef restoration program.

Developing ecotourism services, which began in 2008, was the long-term alternative livelihood objective aimed at achieving self-reliance of the community. By 2013, only 50.03% of the community population relied on fishing. Others transitioned to trading (21.7%), services (10.01%), industry (5%), livestock (3.9%), transport (2.6%), and other miscellaneous activities (6.76%) (Statistics Office of Denpasar, 2014).

The community environmental management program in Serangan Island was supported at all levels of government, from village to national level. Each level performed a role complementary to others. For example, the village administration facilitated group activities, provided land for offices and workshop facilities, and gave access and management rights of the restoration area for the tourism business of the organization. The Denpasar government facilitated several social safety net assistance programs during the program implementation. The Bali provincial government coordinated the implementation of the program, while the national government, through MOMAF, conducted capacity building and provided various facilities to

the organization. Public awareness, education, and training for the community were supported by several NGOs and universities.

Lessons Learned

Local champions are crucial for raising community awareness and providing leadership for community empowerment. The desire and motivation for change in Serangan Island was driven by the youth of the community. They subsequently organized themselves, engaged other parties to support their cause, and invested in developing skills of members. The timing coincided with the adoption of the ICM program in Bali, which facilitated support from government and nongovernment agencies, the private sector, and community stakeholders.

ICM provides a framework for community participation and empowerment. The success of environmental management in Serangan Island was in accord with the principles of ICM, within the framework of the integration of the ecological, social, and economic aspects. The economic strength of the community was raised by developing alternative sources of income.

The most important element of the program was the empowerment of communities in sustainable environmental management which can be achieved successfully through the development of alternative decent livelihoods, and other business opportunities.

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Harmonizing Spiritual and Economic Uses of Gangga Beach in Tabanan Regency, Bali, Indonesia through ICM Approaches

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Key Message

- The success of community empowerment and the sustainable environmental management of Yeh Gangga Beach can be attributed to the willingness of traditional village leadership and the support from local and national governments within the context of the integrated coastal management (ICM) system. The traditional village is a local institution with strong, respected, and trusted leadership committed to protecting the coastal environment.
- The program's success is also attributed to the effectiveness of a motivator who is able to communicate, mediate, and negotiate decisions among stakeholders and encourage participation from the community.
- The Gangga Beach program demonstrates an effective, community-based ICM working modality.

Abstract

Bali's Yeh Gangga Beach is a sacred area used for worship by Hindus. It also serves as a traditional fishing center for the Tabanan regency and as a tourist destination. Its limited beach space was coming under increasing pressure from conflicting uses and was further aggravated by erosion from rock mining of the headland and fluvial waste from inland urban areas. The area is under the jurisdiction of a traditional village, whose leaders are highly respected with its organizational structure being recognized by the community. Social, cultural, and religious rules are obeyed by the villagers. Recognizing the importance of these values and the commitment of the traditional village leadership to rehabilitate and improve the management of Yeh Gangga Beach, the local government partnered with the traditional village to encourage sustainable development of the area under Bali's ICM program. A

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participatory process involving national and local governments, private sector and village led to a zonation plan to reduce conflicts and action plans to reduce environmental degradation as well as to rehabilitate the beach ecosystem. The beach and its functions were restored with improved public access and facilities and support to spiritual and tourism activities. The capacity of the village in integrated planning and management of the Gangga Beach was increased over several years of continued operation, which evolved as a community-based ICM working modality in the regency.

Background

Gangga Beach, approximately 9 km south of Tabanan City in Bali lies within the boundary of Yeh Gangga traditional village and is commonly called Yeh Gangga Beach by the locals. “Yeh” means water while “Gangga” is the name of India’s sacred River Ganges.

The beach is flanked by two estuaries similar to that of the Ganges, and the entire area including the estuaries is named Yeh Gangga. Its significance as a sacred place for the traditional Hindu ritual of bathing and cleansing as is done in the Ganges became widespread such that people from other places would visit Yeh Gangga to observe these rituals. It remains today a sacred place.

Yeh Gangga Beach faces the Indian Ocean and its shore is exposed to strong 2 m high waves. The 2.13 km coastline is divided by a headland into two zones: the east (0.75 km length) and the west (1.35 km). Sediment transported by waves and longshore currents from the sea and from the two river estuaries give the beach its black quartz and iron sand characteristics. The sandy substrate supports beach vegetation dominated by the beach morning glory (*Ipomoea pes-caprae*) formation that maintains stability of the beach sediment. Other species of vegetation include rolle grass (*Spinifex littoreus*), glory bower (*Clerodendron inerme*),

crown flower (*Calotropis gigantea*), and screwpine (*Pandanus tectorius*).

In addition to being a place for sacred rituals, Yeh Gangga Beach remains the base and center of traditional fishing activities, an additional source of livelihood of local folks in the Tabanan Regency. Artisanal fishers consist of 85 households, and use simple fishing gears and small, 7-8 m long boats. The coastal waters provide lobsters, prawns, and fish.

In 2013, the Yeh Gangga village consisted of 460 households with a population of 1,542 (757 males and 785 females). All were believers in Hinduism. The predominant source of livelihood was food crop agriculture. In terms of livelihood, 73% were farmers, 19% were fishers and those in the service industry made up 8% (Sudimara Village, 2013).

In terms of land use, 63% were ricefields with an efficient irrigation system; dry agriculture, 16%; housing and settlement, 19%; and tourism facilities, cemeteries, roads and vacant land, 2% (Sudimara Village, 2013).

With the rapid development brought about by tourism in Bali, the government was promoting Yeh Gangga Beach as a tourist area. The scenic view and seawaves were perfect for surfing, which attracted domestic and foreign tourists. Private investors were buying land along the beach and developing facilities for tourism.

Conflicts over land use and environmental degradation

The multiple use of Yeh Gangga Beach was also bringing about conflicts among users. The area serves as a fishing center of the Tabanan Regency; it is also a place of worship, especially the holding of the melasti ceremony, a Hindu Balinese purification ceremony and ritual; and a tourist destination. Moreover, most of the 2.13 km stretch of land along the beach was barred from public use by business enterprises as there was no zoning arrangement over the use of the beach area.

Environmental problems were further exacerbating the conflicts over the use of the narrow beach area. Heavy erosion triggered by the mining of rocks on the headland on the east end of the beach and at the river mouth was severely damaging Yeh Gangga Beach. The river turned into a meandering stream on the east side of the beach zone, scraping the beach of its sediment and causing heavy loss of sand. The rocks were commonly used as building material for houses and ornaments in the Balinese style and fetched a high price.

Prior to 2005, there was no proper implementation of a waste management program. Thus, solid wastes accumulated along the beach area as well as wastes from upland urban areas through riverine discharge, especially during the rainy season. These caused severe damage to Yeh Gangga Beach threatening the survival of the traditional village in terms of both economic and spiritual aspects. The community, with assistance from the local government, took steps to address the problems by using the framework and approaches of ICM and environmental management of the beach based on community empowerment.

The Yeh Gangga Beach Management Program was developed and implemented within the ICM framework to: (1) protect and preserve values on the sanctity of the beach; (2) protect the beach from threats of physical damage; (3) preserve beach ecosystems to increase tourism value and physical resistance to interference; and (4) take advantage of beach utilization in harmony with ecological, spiritual and economic integrity.

Approach and Methodology

Implementing ICM

The bedrock of ICM requires active community participation in planning and execution of coastal development plans, as well as monitoring activities or projects to ensure effectiveness. However, it is not enough for the community to take action alone. All stakeholders must be involved and it is important

for the local government to seriously assist the community. This approach was successful in resolving conflicts over the use of Yeh Gangga Beach and in abating damage to it.

The erosion of the beach was controlled by building a jetty at the mined headland to stem the sediments being carried away by the longshore current. A riverside embankment made of stones was also built at the river mouth to normalize water flow towards the sea. These efforts were able to control erosion but requiring regular maintenance to ensure that the stones remained tightly packed.

Recognizing the community's commitment to improve their environment, and the spiritual and economic importance of the beach, the Ministry of Marine Affairs and Fisheries (MOMAF) in 2007 facilitated the community's efforts in managing the coastal environment in a comprehensive and holistic manner through the Environmental Management Based on Community Empowerment Program. The program, which adopted ICM principles and approaches, was aimed at raising awareness and building planning and management capacity of the community, other stakeholders, and the local government enabling them to address the environmental problems of the concerned coastal areas. The community was encouraged to determine their priorities and needs towards developing their coastal area. The strategic components of ICM that were implemented in rehabilitating Yeh Gangga Beach were:

1. Institutional strengthening. Yeh Gangga Beach is administered by a traditional village recognized by the State based on the Bali Provincial Regulation No. 3/2001. The existence of the traditional village institution (Box 1) was an advantage in implementing the ICM approach in the management of the beach because:

- a. The institution has a complete organizational structure consisting of three divisions: the *Parahyangan* division, responsible for spiritual aspects; the *Pawongan* division, responsible

Box 1. Traditional village in Bali: upholding local values, culture, and practices.

Balinese Hindus believe in a life philosophy called the *Tri Hita Karana* that has three main elements: the *Parahyangan* or the attachment to a specific place of worship; the *Pawongan* that tightly binds each fellow member, especially the religious Hindu to one another; and the *Palamahan* that roots a traditional village to its territory or land.

The *Tri Hita Karana* provides the basis for the identity, existence, roles, and obligations of a traditional village in Bali called the *Desa Pakraman*. The *Desa Pakraman* is the unity of indigenous peoples who have a whole tradition and manners socially Hindu; living for generations in the bond of *kahyangan tiga* (three main temples in the village level); and that has a certain region and their own property, and have the right to manage their household autonomously.

The *Desa Pakraman* is led by leaders called *parjuru desa pakraman* who are elected and/or chosen by members according to the *awig-awig*, a set of written rules and guidelines that the traditional village observes in the implementation of the *Tri Hita Karana* according to the conditions and values in each village.

The tasks of the traditional village are: (1) to make the *awig-awig* (rules); (2) to manage or take care of its members; (3) to manage the property and assets of the village; (4) to implement development programs, together with the government in all fields, especially concerning religion, culture, and society; (5) to foster and develop the values of the Balinese culture in order to enrich, preserve, and develop national and local cultures; and (6) to secure the members of the village (Regional Gazette of Bali Province, 2011).

for relationship among community members; and the *Palemahan* division, responsible for human relationship with the natural environment;

- b. The institution has rules (*awig-awig*) that are obeyed by the members; and
- c. The leaders of the institution are highly respected by the members.

The traditional village formed a working group to take charge of implementing the program on a daily basis following the agreed plans. Community groups were set up; each led by a chairperson who served as a motivator to encourage a spirit of togetherness in the community and ensure smooth implementation of the program.

The government commissioned a relevant institution from a university to serve as a facilitator in the learning process of the community groups. It ensured that the management plan was implemented based on scientific data and with appropriate methodologies and approaches.

2. Development of a management plan. This step was facilitated in a participatory manner by the facilitator and local government. Issue-based action plans were formulated in three stages:

- a. First phase (2007–2009) focused on planning, strengthening community groups, community awareness, beach rehabilitation, and development of some beach facilities.
- b. Second phase (2010–2012) focused on setting up the agenda for structuring beach use through zoning and increasing public access to the beach.
- c. Third phase (2013–2015) focused on laying the foundation for the program's self-continuity by the community in a sustainable manner through the development of income-generating activities to be derived from management of the beach.

In 2009, the village prepared and implemented a coastal use zoning plan (Figure 1) which included:

- a. regulating the use of beach space that will harmonize the spiritual function with the economic and tourism roles of the beach;

- b. developing facilities that will provide access to the beach and support economic empowerment; and
- c. formulating rules on permitted activities and those prohibited, limited, and conditional (MOMAF/Government of Tabanan Regency, 2009).

3. Restoration and conservation of the beach.

The effective control of erosion did not end with the successful physical restoration of the beach. Maintenance of protection structures was continuously carried out by the community. Beach greening was adopted to maintain the stability of the sediments by introducing vegetation such as beach calophyllum (*Calophyllum inophyllum*), Portia tree (*Thespesia populnea*) and sea-almond

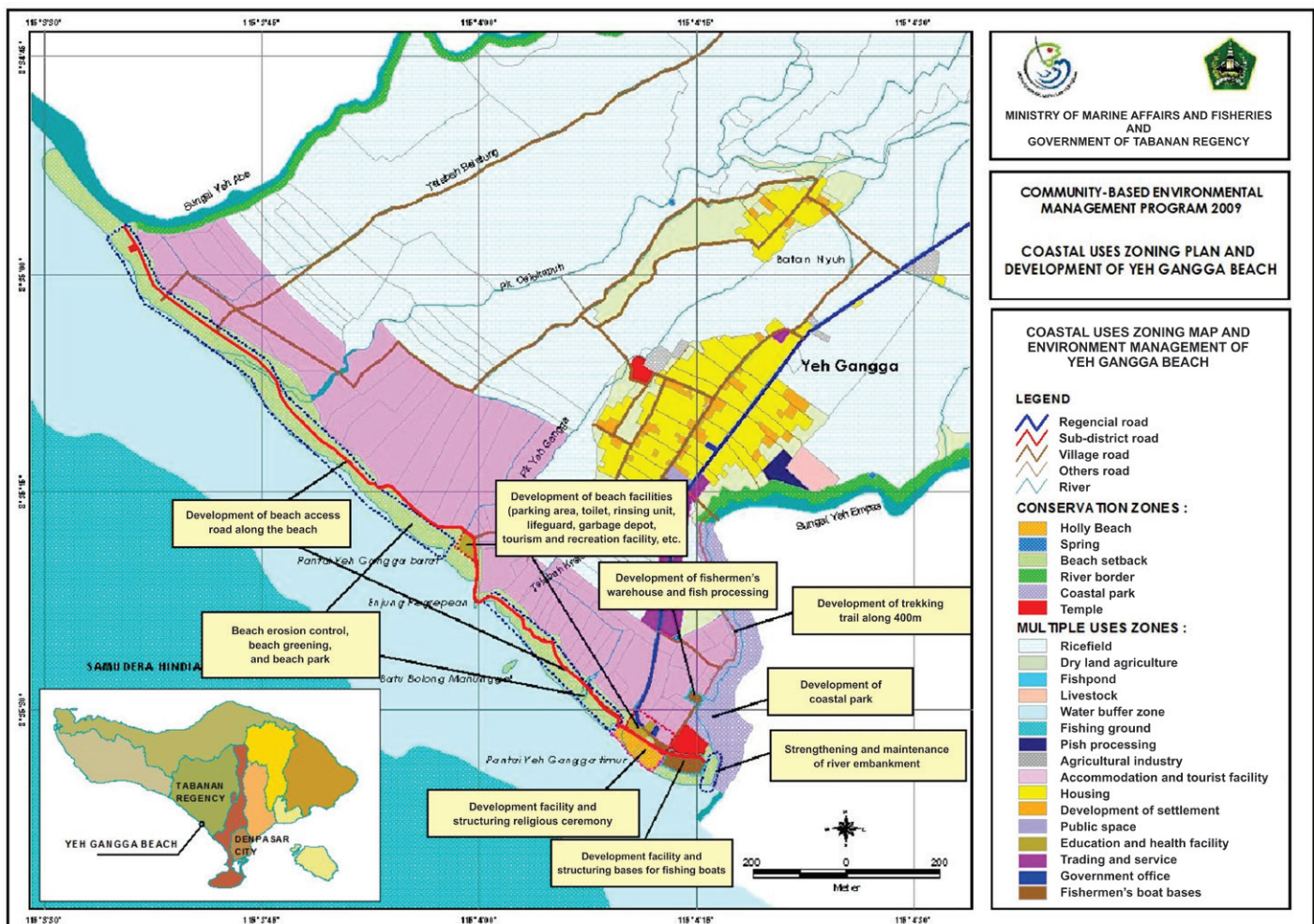
(*Terminalia catappa*). These enhanced the natural beach vegetation of *Ipomoea pes-caprae* and *Pandanus tectorius*.

At present, Yeh Gangga Beach has a wider beach space and the physical condition remains relatively stable. However, small pocket areas still experience erosion, especially during high river flow. This problem remains an important item in the restoration and conservation activities of the beach.

4. Management of solid waste.

The traditional village commissioned a group of people to daily collect solid wastes generated from the use of the beach area for religious ceremonies and recreational activities. They were paid by funds generated from parking fees. The hotel owners, in turn, paid for the transport

Figure 1. Coastal use zoning plan and development of Yeh Gangga Beach (MOMAF/Government of Tabanan Regency, 2009).



of collected garbage to the processing plant. This arrangement was an example of cooperation and shared responsibility between the village and the hotel owners. Waste transported by the river during rainy seasons still needs to be addressed as it requires more facilities and human resources.

5. Development of facilities and access to the beach.

Public facilities, such as toilets, rinsing units, garbage cans, lighting, water supply, and security stations were set up at the beach in accordance with the zoning plan.

More importantly, roads were built to provide public access to the beach, where before, private investors blocked large sections of the beach from public use. Road tracks of 1.5 m width now connect the east beach zone to the west zone, and delineate private land and public space along the beach. This achievement was made after a series of dialogues and negotiations initiated by the community head with the concerned private investors who realized that a sustainable plan for beach area use would benefit all. Eventually, the investors agreed to give up an average width of 5 m from their land for the construction of footpaths along the beach. Personal approach, intensive consultation, and communication with stakeholders were the key features in developing a comprehensive understanding of management efforts and the long-term benefits to all parties.

6. **Economic empowerment.** The target groups of the economic empowerment program in the village were the fishers and the tourist service providers. They were the most economically vulnerable groups in the community being highly dependent on coastal area resources.

Following the zoning plan, activities and programs for the fishers focused in the east zone while the west zone was for the tourist service providers. The programs were facilitated by the local and national governments through partnership and collaborative initiatives.

The programs for the fishers included facilities, such as a warehouse for their catch and fish processing; access to market for their catch and processed products; access to cheap credit schemes; and provision of and assistance in utilizing environment-friendly fishing gear and technology.

Programs for the tourist services group included establishment of restaurant stalls, souvenir shops, support services for tour guides, and cooperation with local entrepreneurs in managing tourist attractions. Efforts to develop and enhance tourism services and facilities are ongoing.

Results

Management capacity has increased

A significant outcome of the initiative was the overall increase in the management capacity of the local leaders through direct involvement in planning and implementation of the coastal management programs. This was only possible with their commitment, understanding of the needs, and their trust in the objectives of the ICM program. With their direct involvement in the ICM process, local leaders were able to develop necessary skills: in the development of the zoning scheme; in negotiating with other stakeholders including private investors; and in generating alternative financial resources to augment and implement their plans. Local government support and technical inputs from academic institutions enhanced the development of local capacity to manage their own coastal area.

A working modality for community-based ICM has evolved

The Yeh Gangga Beach story presents a working modality with the community taking the driver's seat to effect changes through progressive planning and implementation of carefully designed action plans. The organizational structure of the Gangga traditional village has the legal and religious

authority to command compliance of community members to decisions or plans approved by the village leaders. The endorsement by the local and central authorities further strengthened not only the resolve of the community leadership but also the implementation of coastal programs.

The process of environmental management was successfully demonstrated

The management of the Yeh Gangga Beach was undertaken following the principles and approaches of ICM (PEMSEA, 2010) both in the planning and management of program activities. Policies and management of the relevant sectors were integrated. The interaction between land and sea was considered in the rehabilitation and conservation of the beach area and control of pollution. The ecological, sociocultural, and economic aspects were considered holistically in identifying issues and responses to improve the functions, values, and benefits of the beach, while reducing conflicts over uses. Responses of the national and local governments were also integrated to avoid duplication and overlap of effort. Environmental management was supported by adequate and valid data and information through village profiling and participatory mapping.

The planned phases of the environmental management program allowed for adaptive management. As each phase was implemented, necessary adjustments based on changes and dynamics in society and government policies as well as new issues were adapted.

Efforts for sustainable financing

The biggest challenge was the ability of the community to continue sustaining the long-term management of Yeh Gangga Beach to ensure continued economic benefits to the village community and other stakeholders.

The national government installed a drinking water supply facility with desalination technology as an additional source of income as revenues derived

from parking fees and levies of stores to fund beach management were inadequate. It is managed by the village cooperative. While the facility provided the community with cheaper drinking water, the cooperative was able to channel part of its earning to developing beach management facilities. Medium and long-term plans for generating income from tourism were also developed.

Another effort of the national government to support the local initiatives was the implementation of the “Adibakti Mina Bahari Award” program. The award recognizes community groups for their participation in coastal environmental management activities to encourage community trust and commitment. In 2011, the community group and the Regent of Tabanan Regency received the award.

Lessons Learned

The success of community empowerment and the sustainable environmental management of Yeh Gangga Beach can be attributed to the willingness of the traditional village leadership and the support from local and national governments within the context of the ICM system.

The belief, awareness, commitment, and collective responsibility among the indigenous villagers provided a strong foundation to program implementation. The reputation of Yeh Gangga Beach as a sacred area for the community has greatly encouraged people to contribute to its rehabilitation and continuing development.

The role of the traditional village in managing the beach was vital. Institutionally, the traditional village has a strong leadership and commitment in protecting the coastal region. Traditional institutions, such as the village, have values, norms, and rules that are observed by the community. The traditional village leaders were open to external parties, including government, the private sector, and academe, thus, making it easier to transfer knowledge and experiences, and arrive at partnerships with other stakeholders.

Earning the local community's trust is a way to build stronger relationships. The village leaders and community groups earned the trust and confidence of the village members and other stakeholders in the area. They were receptive to new ideas because the leaders took great care in disseminating information about the programs and were transparent with their activities and plans. The leaders were consistently encouraging open participation in discussing the programs with the community.

The national and local governments showed their strong commitment to the program by providing the necessary support and facilitation in accordance with the local needs and capacities and in doing so, earned the local community's trust. Intervention programs introduced by the governments to the area were easily adopted by the community.

The management process was implemented through appropriate steps by identifying strategic issues, determining the root causes of the problems, and developing strategic plans to address them. An action plan was formulated that identified definite phases and measurable results based on concerns and issues raised by the people. The zoning plan provided the structural basis to arrive at a harmonized solution to address the use and interests of the village, vulnerable groups, and the private sector, including hotel owners. The process in arriving at a management plan was implemented in a transparent manner. The village motivator played a crucial role in overseeing and ensuring the proper preparation and implementation of the plan.

The motivator, appointed by the traditional village, was one of the key factors in the success of the program. The motivator was one of the community's leaders with a good record as a police officer and engages in fishing in his spare time.

He has good social and communication skills, was open, and transparent and without perceived personal interests. The motivator encouraged participation from the community and ably mediated and negotiated agreements with all the stakeholders.

Opportunities of higher incomes increase resolve to continue sustainable tourism practices. There is rising optimism in the development of Yeh Gangga Beach as a popular tourist destination, especially for surfing. Its accessibility from other key tourism destinations in the Kuta area suggests that business opportunities and jobs that will arise from tourism and the traditional village's revenues from managing the beach are set to increase. The optimism will further foster the community resolve to improve their management efforts.

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Beach Management and Coastal Tourism Development in Ngu Hanh Son and Son Tra Districts of Da Nang City, Viet Nam

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Key Message

- Effective beach management and sustainable tourism development in Ngu Hanh Son and Son Tra districts were greatly enhanced through an integrated coastal management (ICM) program of Da Nang City.
- A clear vision, policy and legislative support, as well as integrated planning and management were critical to addressing multiple use conflicts and achieving measurable benefits through sustainable tourism.

Abstract

Viet Nam's Ngu Hanh Son district is largely associated with the Marble Mountains and Non Nuoc Beach, while the Son Tra district is known for the Son Tra Peninsula, a natural reserve with huge ecotourism potential for activities such as mountain climbing, scuba diving, and fishing.

Endowed with rich marine resources, these two districts were a logical choice to be the focus of Da Nang City's tourism development. The city hoped that by boosting tourism in these areas, as detailed in the socioeconomic development master plan, it would subsequently stimulate economic growth for the city.

In 2000, Da Nang City was selected as a national demonstration site for ICM. The project aimed to strengthen capacity in managing and protecting coastal resources for sustainable use while promoting development potential.

This case study introduces beach management and coastal tourism development in the Ngu Hanh Son and Son Tra districts, and how they were developed as part of the overall ICM program of Da Nang City.

Valuable lessons learned from this initiative are evaluated.

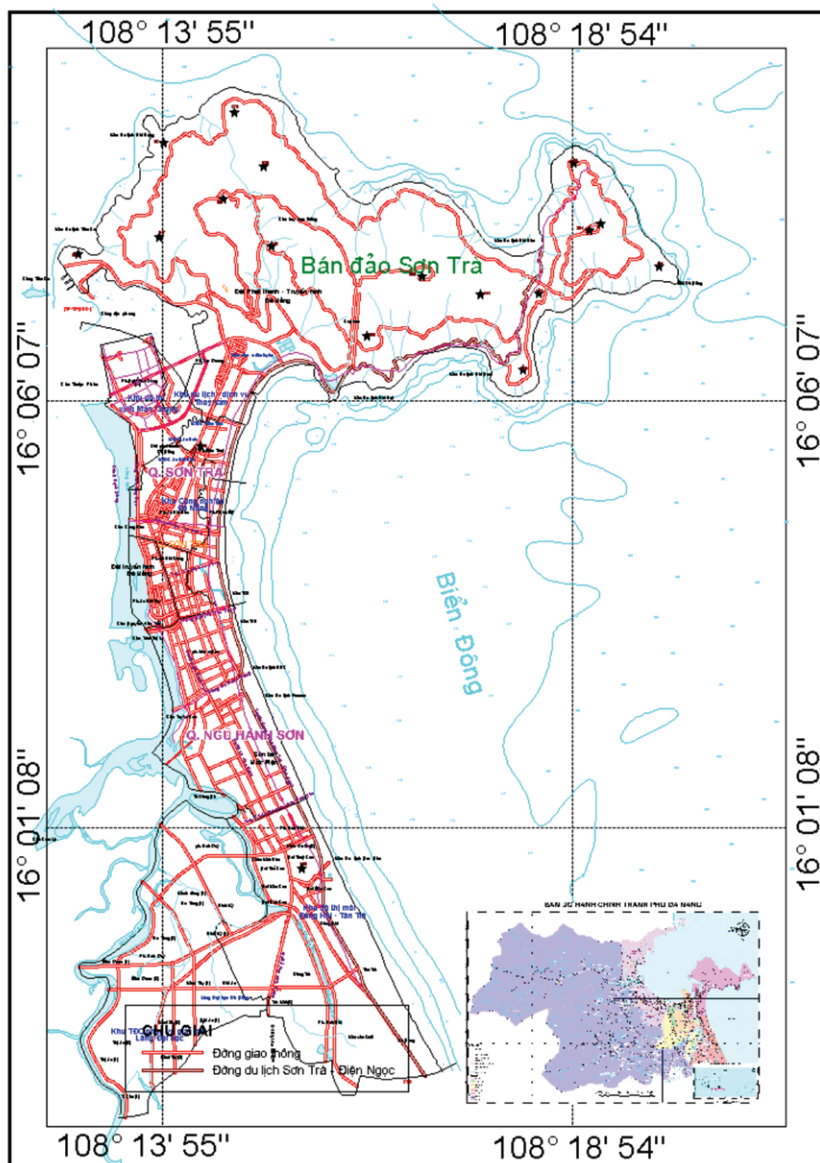
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Background

Son Tra district is located east of Da Nang City, stretching along the right bank of lower Han River on its west, and bordered by the East Sea to the east, Tho Quang Bay to the north and Ngu Hanh Son district to the south (Figure 1).

Son Tra district supports important coastal ecosystems including coral reefs and sandy beaches, thus providing favorable conditions for coastal ecotourism development.

Figure 1. The Ngu Hanh Son and Son Tra districts.



Son Tra district also hosts an international seaport, a major facility for the city's maritime transport services, where warehousing and stevedoring activities offer significant employment opportunities.

Ngu Hanh Son district is located southeast of Da Nang City, roughly 8 km from the city center. It is bound by the East Sea to the east; Hoa Vang, Cam Le, and Hai Chau districts to the west; Son Tra district to the north; and Quang Nam province to the south (Figure 1). It has close to 37 km² of natural area, about 40% of which is agricultural land.

Ngu Hanh Son district has natural forests in Marble and Non Nuoc mountainous areas, and diverse natural vegetation with relatively large, year-round cover along the coasts of Marble Mountains.

The South Sea area of Ngu Hanh Son district is a major fishing ground of Quang Nam Province, offering high value marine harvests such as fish, prawns, squids, clams, abalones, and seaweeds. The district is located in the lower delta of Co Co and Cau Bien Rivers, hence creating a brackishwater environment, conducive for aquaculture development.

The year-round warm climate, fine-sand beaches, historical monuments, and famous landscapes such as the Marble Mountains (symbol of both Da Nang City and Ngu Hanh Son district), were ideal for coastal ecotourism development (Figure 2).

Over the past years, the coasts of Ngu Hanh Son and Son Tra districts were utilized for multiple economic activities including tourism services, maritime transport and port operation, fishing and aquaculture practices, development of coastal industries and infrastructures as well as housing developments for residential use. These activities were causing environmental degradation and loss of natural habitats, for example:

- a. While majority of the district's coastal residents relied on fishing and coastal aquaculture, many fishers were employing destructive fishing gears such as electric fishing and fishing rakes which were harmful to the sustainable harvest of fish resources.
- b. Many coastal stakeholders were typically uncooperative, especially for coastal land and resources uses which did not conform to the city's land use and development plans.

Figure 2. Scenic attractions at Ngu Hanh Son (a) and Son Tra (b) districts.



(a)



(b)

As a result, unregulated use of the coastal areas often resulted in conflicts especially in zones designated for specific use, and in areas assigned for multipurpose activities. Industrial, aquaculture, and tourism establishments rarely observed zoning requirements. Overlaps and conflicts likewise occurred among various sectors' activities including those of maritime transport, port development, fishing, aquaculture, tourism and urban development as well as those related to environmental protection and biodiversity conservation.

The rapid growth of tourism and allied services in the coastal areas of Son Tra and Ngu Hanh Son districts pose further environmental concerns as the current wastewater treatment facilities are inadequate to fully control discharge into the adjacent coastal waters, especially those from nonpoint sources. In addition, seafood contamination as a result of increasing seafood demand and inadequate health safety measures, further pose new threats to public safety. The influx of aquaculture infrastructures to accommodate increasing demands from old and new hotels and restaurants along the coast not only changed the coastal landscape but also triggered soil erosion in some parts of the coast.

Conventional land use plans did not appear to have adequately considered land-sea interaction, thus missing the crucial impacts and potential of the sea. Moreover, the master plan for Da Nang City's development was silent on coral reefs and seagrass beds, and as such contributed to the continuous deterioration of these important coastal ecosystems.

The lack of a multidisciplinary approach and knowledge on the interconnectivity between land and sea also contributed to inadequate or poor management of the city's coastal areas. As the pressures on the use of space and resources in the coastal areas continued, life in the coastal community became more challenging due to the loss of living resources and damage to the ecosystems.

Approach and Methodology

In 2000, Da Nang City started to implement a national demonstration project on ICM which introduced a new and comprehensive coastal governance and management approach. Key activities undertaken included: (a) profiling the socioeconomic, cultural, legal, and environmental conditions of project site; (b) conducting public awareness campaigns and promoting stakeholder participation; (c) developing a coastal strategy and coastal use zoning plan; (d) establishing a coordinating mechanism to reduce policy and management conflicts among agencies; (e) establishing an integrated environmental monitoring program (IEMP); and (f) developing the capacity of local staff to support plan implementation. The ICM approach provided a sustainable development framework and process which allowed the city government to achieve its sustainable development objectives over time using its own human and financial resources. Both Ngu Hanh Son and Son Tra districts were covered by the project and therefore benefitted from its development and execution.

On 10 October 2005, the People's Committee of Da Nang City approved the coastal use zoning plan through Decision No. 7825/QDUB. Prior to its development, the land use and sectoral development plans of Da Nang City had excluded the marine and coastal areas (PC, Da Nang City, 2005).

Da Nang City's coastal use zoning initiative was aimed at improving the effective planning and management of its coastal space and natural resources and at optimizing the coastal area's potential for sustainable development.

The zoning plan provided for tourism development of Son Tra–Dien Ngoc coast. It covered the beaches of Nom, Con, and Trem, including waters within 300 m of the coastline. Also identified were the tourism spots around Son Tra Peninsula (coast,

beaches, and about a square kilometer of seawater) and Bac Tien Sa, located along the eastern shore of Da Nang Bay.

Coastal management of Da Nang City was guided primarily by the following strategies:

- a. Develop Da Nang coast into a major tourism area within its capacity, both at national and regional levels;
- b. Conserve and protect the landscapes and ecological values of the coast, especially in Ngu Hanh Son area;
- c. Maintain stability in the coast and mitigate risks of erosion, flooding, and groundwater contamination;
- d. Limit economic development in high-risk or sensitive ecosystem areas; and
- e. Ensure public or community access to public beaches.

This case study places its focus on strategies a, b, and e as they relate to Son Tra and Ngu Hanh Son districts.

Results

Prior to the approval of Da Nang City's Coastal Strategy in 2001, relevant sectors and district governments proposed to enact the necessary legislation(s) to regulate the use of coastal and adjacent marine areas as well as the natural resources therein. The Department of Agriculture and Rural Development likewise sought the city government to issue regulation on the management and conservation of coral reefs and other coastal habitats from Hon Chao to South Hai Van and Son Tra peninsula. The Department of Natural Resources and Environment advised the city

government to issue regulations on ICM for Son Tra and Ngu Hanh Son districts.

In response, the city issued regulations on fisheries and protection of coastal aquatic resources, particularly in mitigating the negative impacts on spawning and nursery grounds. It also enacted specific guidelines for managing fishing activities and aquaculture practices in the inland and coastal waters, as well as guidelines for regulating pertinent business and service activities related to the use of beaches particularly for environmental protection and preservation of beach landscapes.

Various initiatives from stakeholders also supported the city's efforts in sustainable management of the coastal areas. Relevant sectors and district governments stepped up their information and education campaigns especially at community levels. They also conducted activities to facilitate surveillance to protect and conserve forest and fisheries resources. Projects to recover and improve coral reefs and seagrass beds in the waters surrounding Son Tra peninsula and Ngu Hanh Son areas were implemented. Similarly, local fishers were encouraged to take up new livelihoods to reduce excessive fishing efforts.

The city government officially decided that Da Nang will be transformed into an Environmental City by 2020. This policy decision greatly enhanced the efforts of district governments to include environment protection and conservation as a crucial component of sustainable economic development programs.

A major effort was to improve fisheries management by regulating fishing and controlling illegal fishing. The local authorities implemented the following:

1. Five new ships were built for offshore fishing worth VND 3.2 billion (US\$ 145 thousand), along with the following assistance: (a)

insurance premium to some 3,000 crew members of fishing vessels with a capacity of over 50 CV (*cheval vapeur*); (b) sea products storage; and (c) aid to fishers switching jobs or give support equivalent to roughly VND 4 billion (US\$ 182 thousand);

2. Linked up with various organizations and enterprises in building 183 houses for fishers, and assisted in the implementation of three welfare projects valued at more than VND 8.2 billion (US\$ 372 thousand);
3. Constructed four safety/rescue stations to support the operations of 660 fishing boats, 42 of which were for offshore fishing;
4. Motivated relevant line agencies to implement key decisions and new regulations including: (a) Decision No. 06/2005/QD-UB, which regulates organized fishing; (b) Directive No. 08/CT-UBND issued on 3 April 2006, which prohibits the use of rakes in fishing and other illegal fishing activities in Da Nang City's coastal area; and (c) Decision No. 8329/QD-UBND dated 19 October 2007, which seeks to develop and protect the aquatic resources from 2010 to 2020; and
5. Promoted sustainable aquaculture practices in areas allocated for aquaculture practices in the zoning plans. Consequently, aquaculture production reached 913 tons in 2010 – an increase by more than 160% compared to 1997. The total value from aquaculture production increased by 85%, estimated at VND 360 billion (US\$ 16 million).

Driven by the Coastal Strategy, the city was able to collect and treat wastewater at its centralized treatment station, hence reducing waste discharge into the coastal waters. Many of its recreational beach areas, in particular those along the coast of Son Tra and Ngu Hanh Son districts, benefited

since many point-source pollutants could be controlled.

In line with the government's thrust to develop coastal ecotourism, relevant line agencies have either rehabilitated or constructed coastal roads, making it easier to promote designated coastal areas for tourism. The influx of tourists provided livelihood opportunities to those living in the coastal communities of the districts. Former fishers became resort staff after training, while some trained on fine arts/handicrafts. Others became involved in providing services in hotels, restaurants, and parking places near the beaches. However, the city imposed regulations, such as restrictions on tourist infrastructure (i.e., not to develop more than 30% of total area), greening requirements in resort areas, solid waste collection, etc.

Thousands of fishers transferred to new housing, and got employment in public and tourism services. Consequently, Da Nang City was able to set the stage for effective tourism development including building infrastructures and tourist facilities.

With increased public awareness, beach management gradually improved the conditions of the beaches, which became clean and clear of beach vendors and litter. In 2005, Forbes Magazine cited the coast along Son Tra and Ngu Hanh Son districts as one of the six most beautiful beaches in the world.

The convergence of Ngu Hanh Son's natural beauty, the near-mystical charm of the Marble Mountains and the coastal road which connects with Hoi An, (an ancient town in Quang Nam province) attracts thousands of domestic and foreign tourist as well as investors who confidently built world-class resorts. Da Nang City could now boast of having the finest beaches with an excellent road network, top-class facilities, and a scenic landscape ideal for the booming vacation resorts.

More tourists mean more jobs especially for the locals, and increased revenue to the districts and the city. To help fishers switch to a more sustainable livelihood and reduce their dependence on nearshore fish resources, the Da Nang Department of Agriculture and Rural Development implemented a transition support program in 2011. Six pilot fisher-households in Son Tra district received nearly VND 400 million (US\$ 18 thousand) worth of assistance under the program. It introduced a new group-fishing scheme, replicated later on in other coastal districts of the city.

According to Mr. Dang Van Phu Em, a program participant and resident of An Hai Tay commune, Son Tra district, each of their 6-7 day fishing trips generated VND 400 million (US\$ 18 thousand) in gross revenue, or an equivalent to VND 260 million (US\$ 11 thousand) net profits.

Lessons Learned

The following key lessons were learned from the above initiatives:

1. Sustainable coastal development is the guiding principle that enables the local government to consider not only economic growth but also environmental integrity and social benefits. ICM provides a broad, holistic planning and management framework that ensures adequate interagency coordination as well as policy and management integration. The vision towards an environmental city has generated not only the direction for future development but also set the target for city planning and implementation.
2. With the broad city development framework and direction, district governments could reap not only social and financial benefits but also collective support in the conservation and

protection of their coastal ecosystems. District governments could play active and cohesive roles under a larger local government framework.

3. The experiences of Son Tra and Ngu Hanh Son districts have demonstrated that regulatory measures and management interventions are necessary in addressing multiple uses in coastal areas. While zoning plans reflect not only the best use of the ecological potentials, appropriate measures are needed to address current dominant uses such as fishing. Support and participation of the stakeholders are also critical.
4. Both districts have been able to take advantage of city policy in ecotourism development to bring about major reforms of the coastal communities not only to sustain fishing as one of the major economic activities but also transform local tourism into a major industry with significant increase in domestic and international tourists.
5. The construction of the coastal roads has certainly facilitated transportation and effectively prevented damage to coastal areas caused by unrestricted entry of vehicles and use of coastal lands. There is evidence of improvement of quality of coastal water and reduction in sediment discharge, and restored habitats in Da Nang Bay. Some wetland areas along the rivers that were previously pollution hotspots and a source of diseases have now become modern residential areas with parks for public recreation.

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Enhancing Effectiveness of Marine Protected Areas through Networking and Implementation of the “Ecological Red-line” Policy

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Key Message

- The “ecological red-line” policy can be an effective tool for biodiversity conservation in conjunction with zoning permit fees and a “zoning pay-back” scheme. These are innovative financing options that can be used to support marine protected areas (MPA) management and operation.

Abstract

Dongying City is located in the Yellow River estuary. The area is recognized as ecologically significant, with nesting sites

for migratory birds and nursing grounds for various marine species. The city government implemented a comprehensive ICM program and adopted a holistic and vision-oriented approach and a working model for integrated planning, coordination, and management. Dongying successfully hosted and implemented a natural nature reserve (NNR) and five special marine protected areas (SMPA) in close cooperation with national agencies. It effectively utilized zoning permit fees from its functional zoning scheme to support and build up management capacity. The Dongying initiatives verified the effectiveness of utilizing the “ecological red-line” policy to support preservation of the Yellow River delta.

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Background

Dongying is a coastal city located in the estuary of the Yellow River (Figure 1). The city hosts the second largest oil industry in PR China and is also one of the cities in northern China with a rapidly developing marine economy (Hou, 2011). The local government efforts in ensuring sustainable use of the coastal and marine resources were greatly enhanced with the implementation of a comprehensive ICM program. The setting up of an MPA and functional zoning was an integral part of the ICM program under the leadership and coordination of the local government. This case study showcases the development and networking of the MPA and the application of the national “ecological red-line” policy within the broader framework of the local ICM program.

Approach and Methodology

Recognizing the ecological importance of the Yellow River, the national government established the Yellow River Delta National Nature Reserve, on the northeast coast of the city (Figure 2). In addition, five national SMPA were established between 2008 and 2009 (Figure 3). SMPA is defined as “any special geographical space identified for special marine economic development administered and managed through effective protection of the ecosystem and sustainable use of the living and non-living resources therein using appropriate scientific approaches” (SOA, 2005). In total, Dongying set up six national MPA, including one NNR, (i.e. the Yellow River Delta National Nature Reserve, 1,530 km²); and five national SMPA including those for shellfish in Hekou (396 km²), for benthic fish in Lijin (94 km²), Yellow River

Figure 1. Dongying City at the estuary of Yellow River.

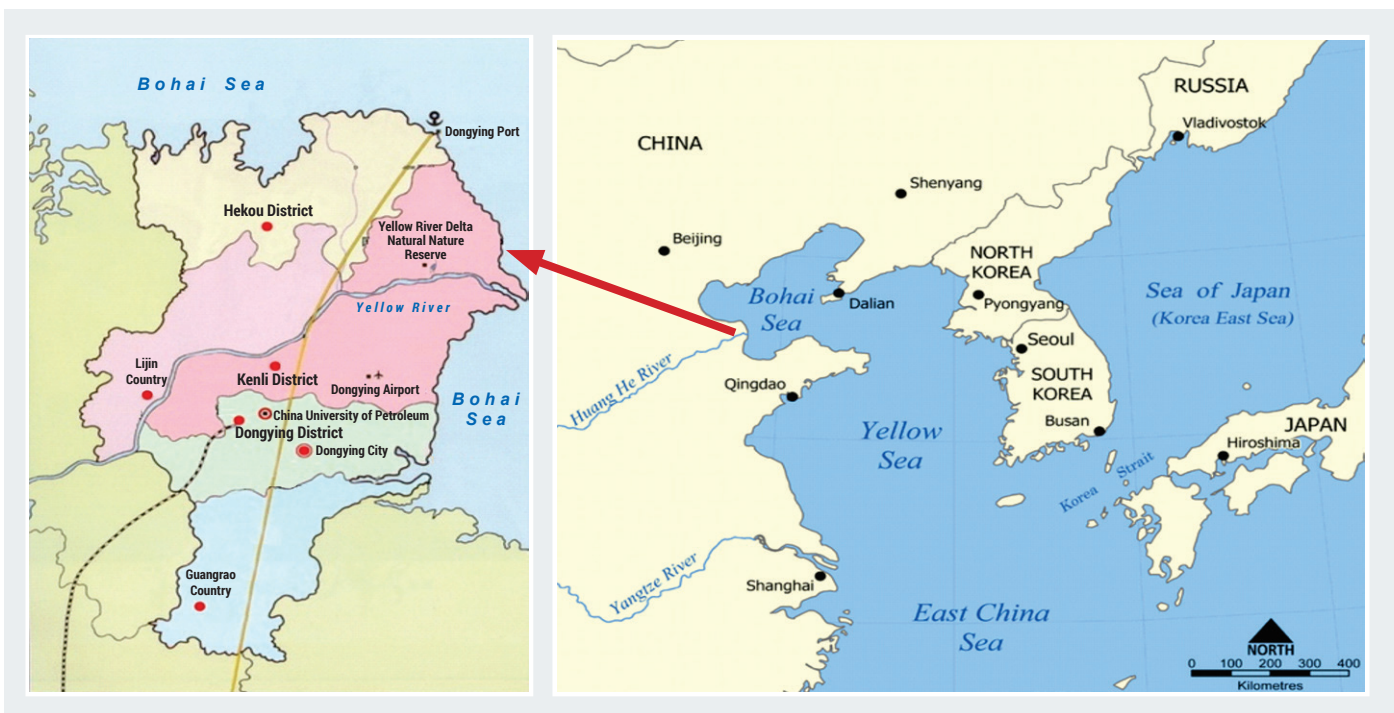


Figure 2. The Yellow River Delta NNR.

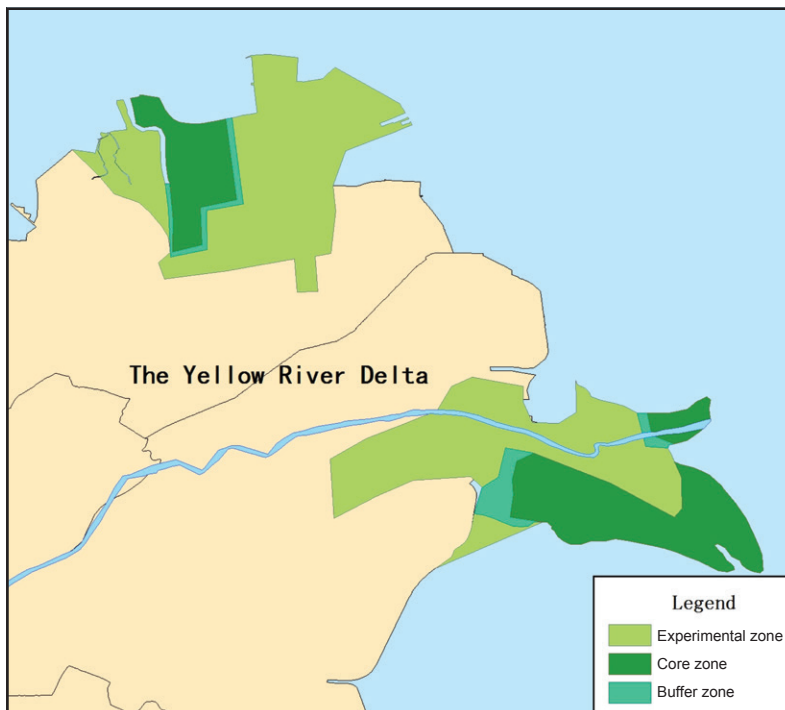
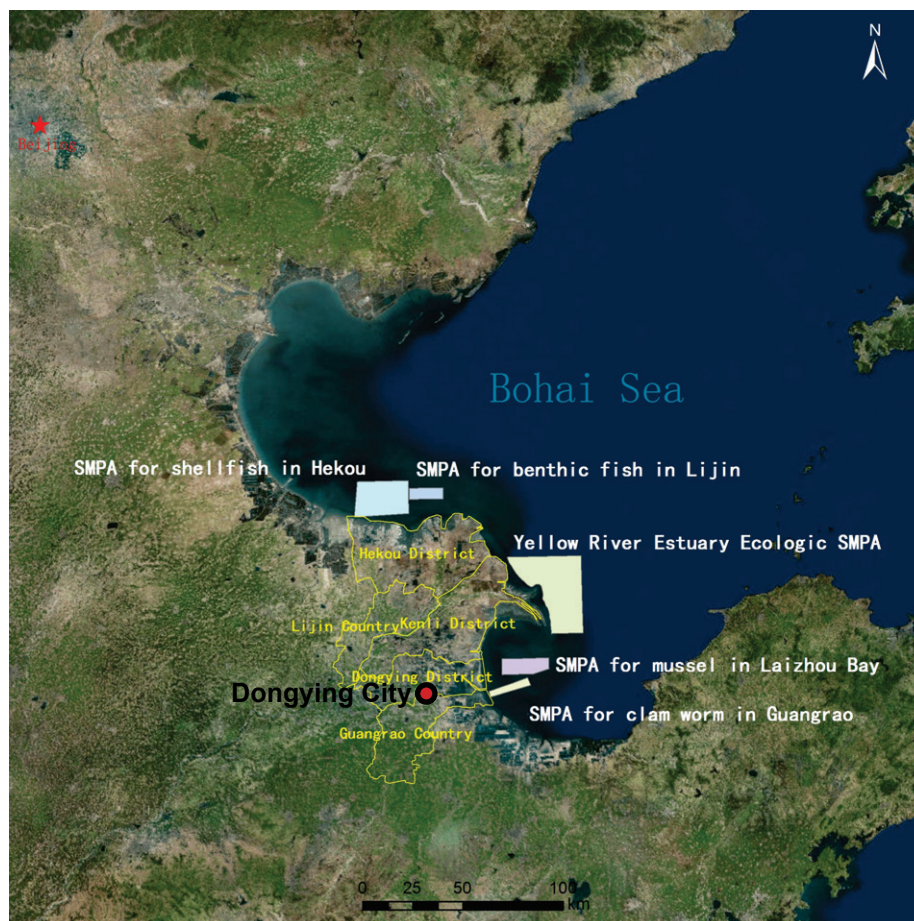


Figure 3. The five SMPA in Dongying City.



Estuary Ecologic SMPA (926 km²), for mussel in Laizhou Bay (210 km²), and for clam worm in Guangrao (65 km²). The main differences between an NNR and an SMPA lie in their objectives, scope, standards, zoning schemes, protection and management tasks, approving government agency, and environment requirements (Table 1).

Dongying City actively participated in a Global Environment Facility (GEF) Project on “Demonstration of Estuarine Biodiversity Conservation, Restoration and Protected Area Networking in China” to strengthen local capacity in managing MPA. The project’s specific objective was “to mainstream the conservation of estuarine biodiversity into economic development plans and to develop a series of best practices. The best practices were based on experiences derived from field activities focusing on the creation of protected area networks and wetland conservation

and restoration in the Yellow and Pearl River Estuaries” (GEF, 2009).

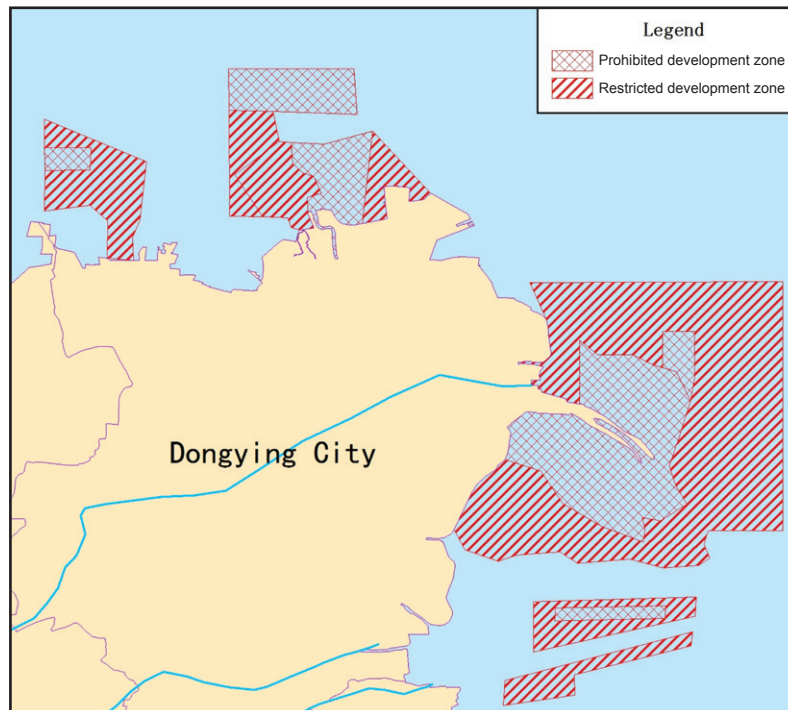
In the communiqué of the Third Plenary Session of the 18th Communist Party of China Central Committee, a proposal was put forward to establish an “ecological red-line” as a policy for regulating human activities in areas of ecological significance. This was supported by the Chinese leadership, which directed the drawing up of a “red line” for ecological protection and the development of an economic compensation system based on the user pay principle. This policy focused on enhancing the management and protection of identified ecologically important areas by controlling the use of coastal zones. In 2012, SOA finalized and announced the Bohai Sea Marine Ecological Red-line Zoning Plan, which clearly identified zones for restricted and prohibited developments (Figure 4).

Table 1. Main differences between NNR and SMPA*.

Difference	National Nature Reserve (NNR)	Special Marine Protected Area (SMPA)
Designation objectives	Strict restrictions on human uses (NRC, 2001)	Conservation and appropriate multiple use (SOA, 1992)
Designation scope	Focus primarily on original, valuable, and natural habitats and species	Focus primarily on sustainable development and multiple uses of marine resources
Designation standards	Social and economic developments are not taken into consideration	Socioeconomic, natural resources and ecological environment aspects are covered
Zoning schemes	Core zone, buffer zone, and experimental zone are included	No take zone, sustainable resource use zone, ecological restoration zone and reserved zone are included.
Protection and management tasks	Main focus is on constraint enforcement and closure management in terms of different zones	Cover many aspects in marine resource sustainable development such as marine development plan, and optimization of marine industrial structure
Government agency for approval	3 relevant materials for NNR establishment application are submitted to the State Council for final approval and declaration (Qui, et al., 2009)	Relevant materials for SMPA establishment application are submitted to the State Oceanic Administration (SOA) for final approval and declaration (Qui, et al., 2009)
Environmental requirements	Should meet >Grade I, which is the strictest standard (SOA, 2012)	Depends on actual requirement of marine function zones, which means less restricted and more flexible than that of NNRs (SOA, 2012)

* Table modified from China’s SMPA policy: trade-off between economic development and marine conservation (Ma, et al., 2013).

Figure 4. Marine ecological red-line zoning plan of Dongying City.



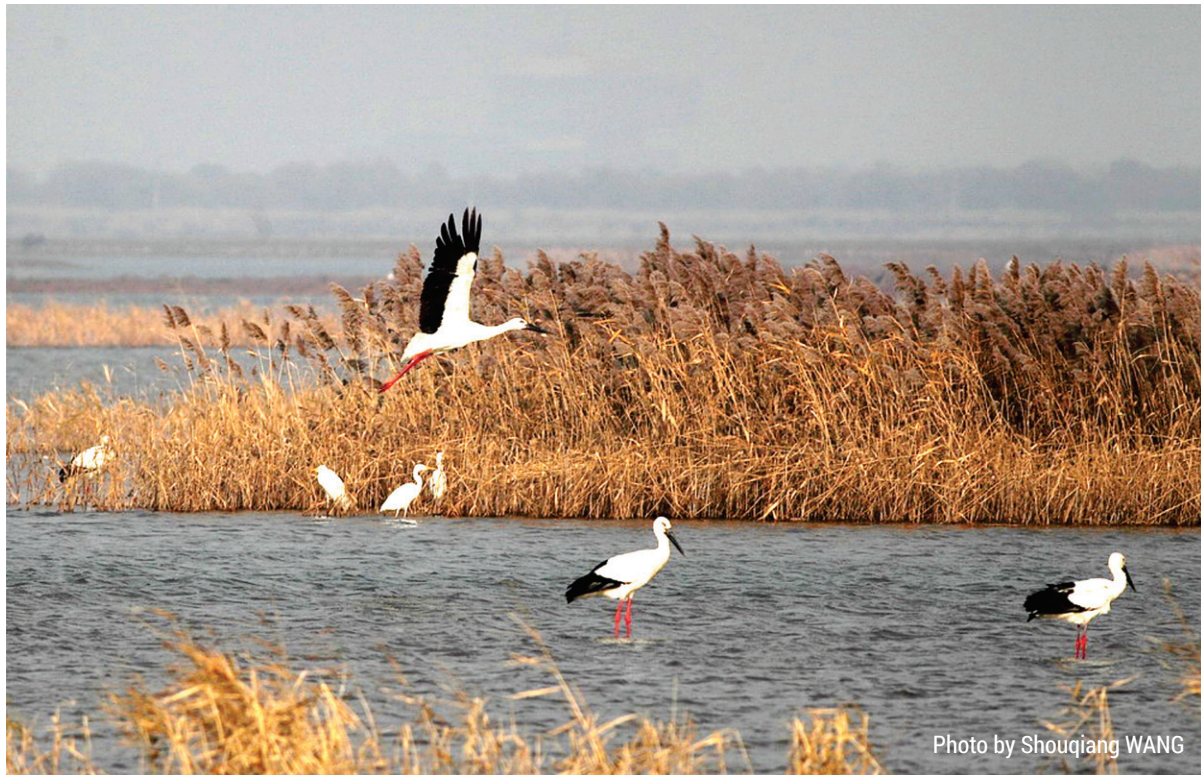
Results

Formation of a local MPA network. The NNR and five SMPA were able to form a local MPA network around Dongying City. This network played an important role in regional biodiversity conservation and protection, particularly for migratory birds and fish (Sun, et al., 2015; Zhai, et al., 2015). Several scientific research projects were also undertaken to establish the biological linkage of MPA in the region to be more efficient and effective in conserving their biodiversity values.

Improvement of MPA management capacity. After the establishment of SMPA, each management office started to raise funds for undertaking improved management measures of the MPA. The offices developed project proposals and secured the approval of the central government

for utilizing a “sea use pay-back” scheme. The five SMPA were able to secure a total of RMB 39.73 million (US\$ 6.3 million) from 2011 to 2012. This fund was used primarily for capacity development and ecological restoration. The management capacity of the MPA significantly improved through the use of monitoring cameras, law enforcement instruments, and a geographic information system. The biomass of protected targets increased through the control of human activities and the release of fingerlings of four species of fish. The water quality also improved through artificial wetlands restoration in the Yellow River Estuary Ecologic SMPA, an important spawning ground for crab and shrimp in Bohai Sea. Through these efforts, the effectiveness of MPA improved over the years and the damaged habitats were finally restored. With the experiences gained, the overall planning for NNR and SMPA was finally completed and approved in 2014.

Figure 5. The oriental white stork in the Yellow River Delta NNR.



Improvement of coastal environment. The Yellow River Delta is one of the important habitats for migratory birds along the Asian and Pacific migratory pathways (Fu and Zhang, 2010). From 1997, oriental white storks (*Ciconia boyciana*) were found every year during the migratory seasons (Duan, et al., 2015; Figure 5). In 2003, a couple of these oriental white storks was found nesting in the nature reserve, setting the first nesting record. In 2005, two nests were found. The number of nests increased year by year. In 2014, a new record of 50 nests was recorded. In 2013, the China Wildlife Conservation Association (CWCA) awarded Dongying “the home of the Oriental white stork in China”.

Lessons Learned

Capacity development is a continuous process to cope with increasing management challenges.

Dongying faced many challenges in improving the ecological functions of the Yellow River Delta and the adjacent coastal areas. The increasing pressure for coastal and sea areas for economic development demanded efficient and effective coastal governance to ensure wise and sustainable use of the limited coastal and marine resources. Towards this end, the government of Dongying maintained a strong coordinating role through the Interagency Coordinating Committee, an institutional mechanism established under its ICM program. The coordinating mechanism provided the needed platform for closer consultation among concerned agencies for the

implementation of the MPA. This facilitated the implementation of management measures across jurisdictional boundaries. Management capacity developed over time through on-the-ground implementation.

Innovative financial resources should be solicited to sustain the effective management of the MPA. Another implementation challenge was the financial investment needed to sustain MPA and their network. Innovative financing mechanisms such as the collection of sea use fees proved effective to generate financial resources. Although the collected fees were paid to the treasury, substantial allocations were provided to meet local demands. As such, SMPA were able to sustain their operations. Through such measures, financial resources generated from the site through the sea use permit fees were diverted back to the local government and utilized for its environmental improvements.

The “ecological red-line” policy facilitates biodiversity conservation and implementation of the coastal zoning scheme. The “ecological red-line” was an arbitrary line drawn by the government through close consultation with concerned experts to delineate areas which restrict or prohibit economic activities. Such an approach, though subject to criticism on scientific objectivity, proved to be effective as a governance tool to regulate strong competition for limited coastal and marine areas for development. The approach was implemented effectively in regulating farmland or agriculture land conversion and protecting ecologically sensitive areas.

The Dongying experience underscored the role of the local government in the management of MPA in terms of interagency coordination, financing, and policy implementation, to be effective in addressing area-wide challenges arising from multiple use conflicts, competing budgets and

management issues across boundaries. Although effective networking facilitated mutual learning, sharing of experiences and promoting MPA management were essential. The involvement of the local government ensured management stability and sustainability.

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Integrated River Basin Management at the Local Level: Experience from Houay Champi Sub-basin, Lao PDR

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Key Message

- The integrated coastal management (ICM) system can be applied to river basins in land-locked countries such as Lao PDR. Like ICM, integrated river basin management (IRBM) can be adopted at the local level to address the practical needs of the villages in sub-basin areas, within the confines of available management capacities, both human and financial.
- The systematic process of establishing IRBM at the sub-basin level needs to be participatory and adaptive. It takes time and continual effort on the part of IRBM managers and implementers to engage stakeholders in the process as the implementers themselves are also in the process of learning. Progress can be made in the short term by engaging those stakeholders that are ready to act, and over time, by expanding the understanding and capacity of all stakeholders.
- Projects such as establishing a village fund for alternative livelihoods not only benefit households socially and economically, but also enhance people's understanding of the advantages derived from restoring and safeguarding the community's principal shared natural resources: the rivers and the forests.

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Abstract

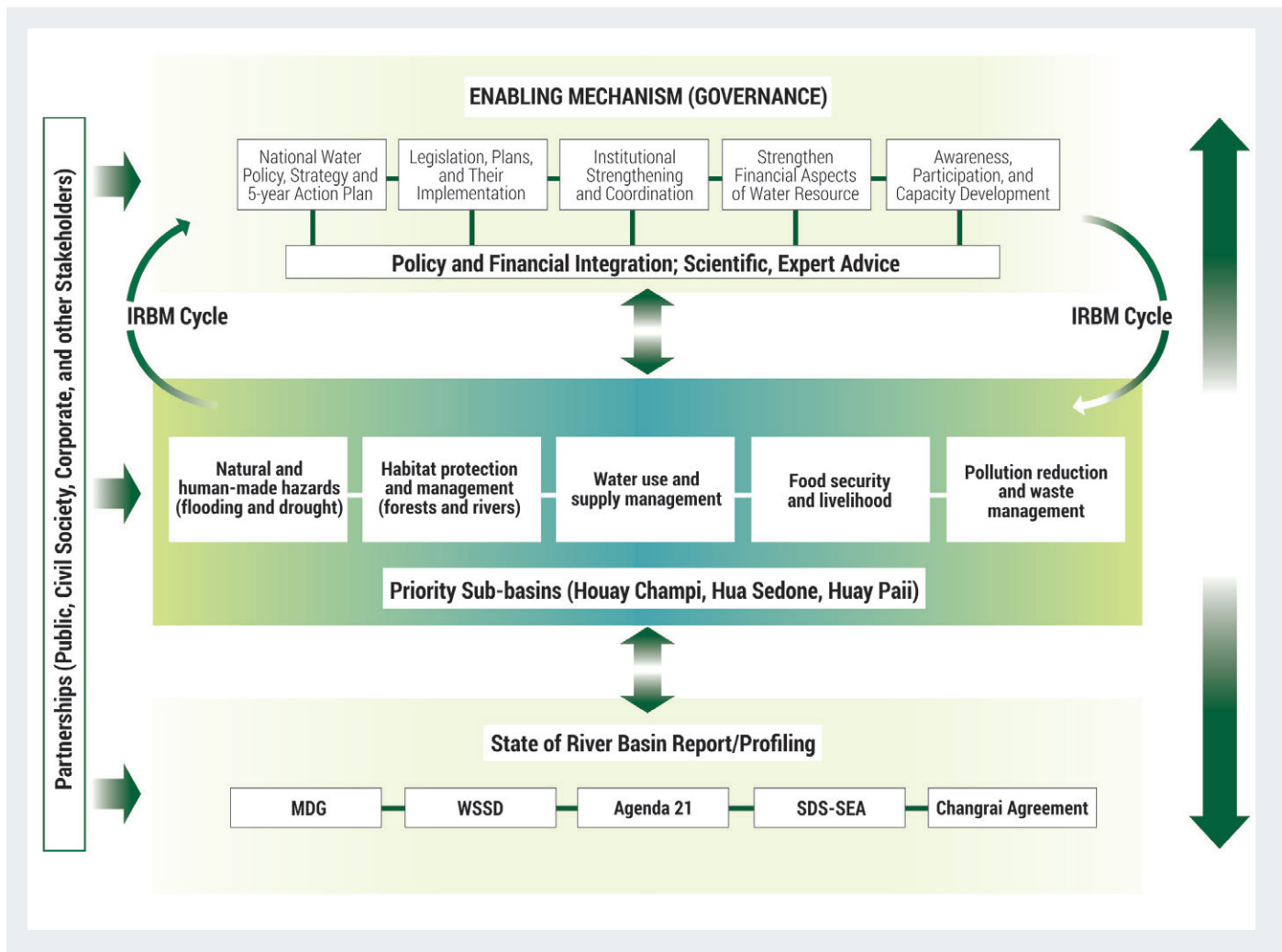
The Sedone River basin was selected as a priority site in 2007 as part of the government's effort to strengthen IRBM implementation in the country and to gain lessons and experiences for replication in other river basins.

The southern capital of Sedone is economically important as it produces and exports most of the country's coffee products. Tourism is also a major economic activity. Implementation of the Sedone Integrated River Basin Management Project (SIRBMP) by the Provinces of Champasack,

Saravanne, and Sekong was also guided by the Framework for Sustainable Development of Coastal Areas (SDCA) of PEMSEA (Chua, 2008; Bonga and Chua, this volume).

A resulting IRBM framework was developed for Sedone (Figure 1). Its application at the basin level was later extended to include sub-basin initiatives in Houay Champi with the help of the Department of Water Resources (DWR) and funded by the Swiss Agency for Development and Cooperation (SDC).

Figure 1. Sustainable development framework for river basin through integrated river basin management (adopted from Chua, 2008).



The implementation of SIRBMP showed that IRBM and ICM are complementary approaches and mutually reinforcing. They can be applied across different geographical and administrative levels to address river basin concerns such as water management and sustainable livelihoods.

Background

Lao PDR is the only landlocked member-country of PEMSEA. Lao's membership was formalized with the signing of the Haikou Partnership Agreement in December 2006, which set the tone for its implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA). The country's membership was prompted by its need to strengthen the management of river basins using PEMSEA's experience in ICM.

Following the Haikou Partnership Agreement in 2006, missions were organized in 2007 to conduct a rapid assessment of the Sedone River basin (Figure 2). A report was initially prepared in 2007 following the preparatory stage of SIRBMP and subsequently updated and reorganized in

2008 following the State of the Coasts Reporting framework (Padayao, this volume). As a new PEMSEA member-country, a baseline report known as State of the River Basin (SORB) was developed by the Project Management Team from the national and local levels, providing information on the country's overall resource management and the socioeconomic, environmental, and management status of the three Provinces of Champasak, Saravan, and Sekong (Figure 3).

Figure 3. Rapid appraisal information was used for this SORB Report.

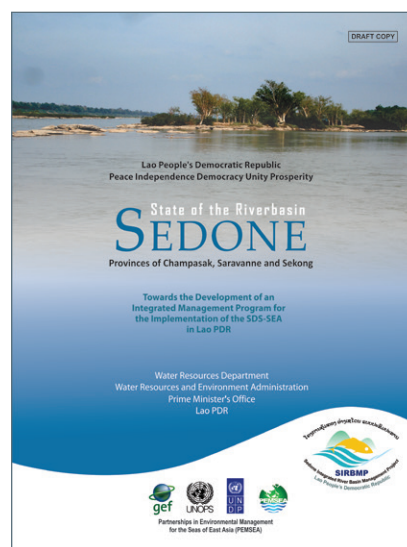


Figure 2. Rapid appraisal for the development of the SIRBMP.



The report was used in the initial planning of the SIRBMP. On 8 October 2009, a Memorandum of Agreement was signed between the provinces and DWR for the implementation of the SDS-SEA.

Using information from SORB, the Sedone Strategy was developed as a counterpart to PEMSEA's coastal strategy and implementation plan of the ICM sites (Provinces of Champasack, Saravanne, and Sekong and DWR, 2013, 2015). The Sedone River Basin Sustainable Development Strategy embodied the common vision and mission among various stakeholders in the Sedone River basin towards sustaining the environmental and socioeconomic values by protecting the ecosystem's functional integrity to improve the people's quality of life. It provided an integrated and comprehensive management framework for stakeholder participation in decisionmaking and knowledge and skills-sharing for the attainment of the common vision. The strategy contained targeted outcomes and a series of action programs, as well as the roles of stakeholder groups from government and nongovernment entities.

The strategy was the result of a series of consultations at the provincial and basinwide levels. The provincial consultations allowed the stakeholders in each province to identify the values, discuss threats, develop a shared vision and mission, and identify objectives and action programs to resolve priority issues. The workshops provided opportunities for the stakeholders to participate in the planning process, and informed others on the situation of the river basin in their respective communities. The basinwide consultation enabled the stakeholders to discuss and arrive at a consensus on which strategies to use based on the three provincial consultations.

As part of the implementation of the Sedone Strategy (Provinces of Champasack, Saravanne, and Sekong and DWR, 2013, 2015), a proposal was developed to implement the Houay Champi

sub-basin management. It was approved, and implementation commenced in 2011. Several government agencies and economic sectors (i.e., industrial, agricultural, tourism, and domestic) were involved in the development and management of water resources in the Houay Champi sub-basin, with each having a separate and distinct development plan and management mechanism.

In the past, the mechanism to harmonize development across the sectors in the sub-basin area was weak, resulting in conflicting plans and uses among the different sectors. There was no forum for discussion and consultation, with fragmented information-sharing arrangements among concerned agencies and levels of government. Moreover, law enforcement was essentially ineffective due to lack of resources among the various regulatory agencies. As a result, illegal activities were prominent. Encroachment due to expansion of agricultural activities and human settlements was causing deforestation of the headwater area, resulting in negative impacts on the river system, including increasing sediment and pollutant loading. Conflicts were also evident among the different stakeholder groups, including industrial and household water users during the dry season. Limited infrastructure along the Houay Champi River, including water reservoirs, meant that there was limited water supply available to different users during dry season.

Approach and Methodology

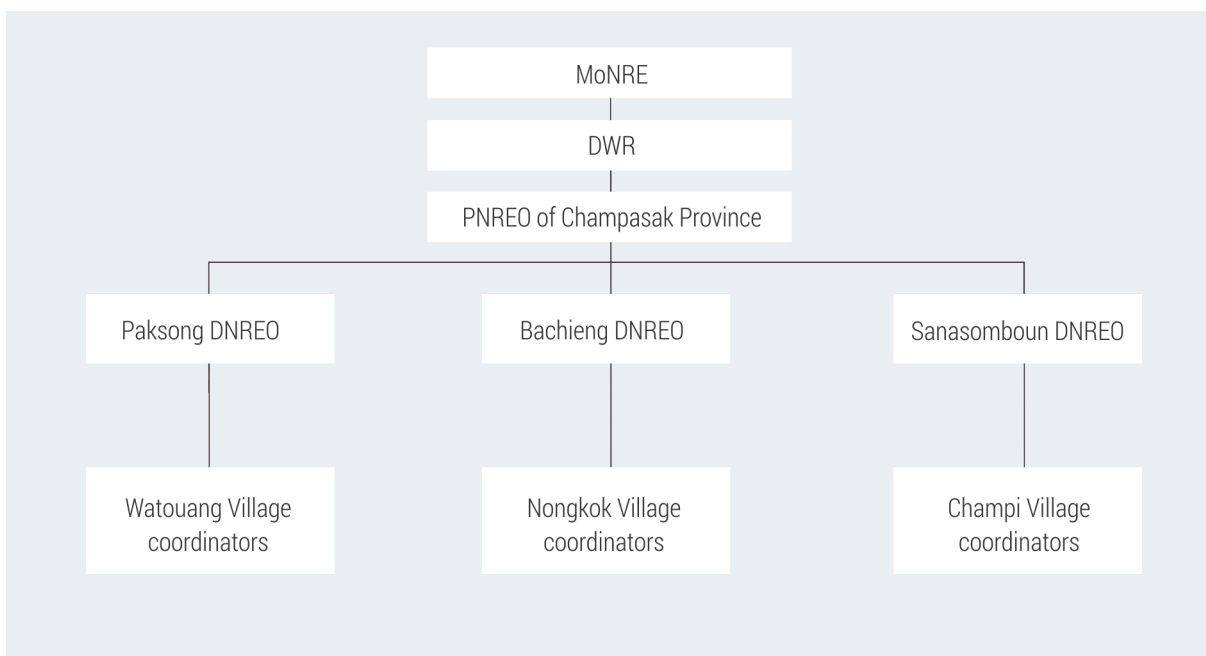
In response to the identified concerns in the Houay Champi River sub-basin, a demonstration project was developed by DWR and the Province of Champasack to gain knowledge and experience in river basin governance and management at the local level. The project was supported by SDC. The following were considered priority steps in the IRBM process of the Houay Champi Project.

Set up a coordinating arrangement that includes primary stakeholders. The project was implemented by DWR, Ministry of Natural Resources and Environment (MoNRE) in collaboration with the Provincial Natural Resources and Environment Office (PNREO) of Champasack Province and the District Natural Resources and Environment Office (DNREO) of the three districts of Paksong, Bachiang, and Sanasomboun, as well as the local community and private sectors within the Houay Champi sub-basin (Figure 4).

A multisectoral Project Steering Committee (PSC) and a coordinating office were established in Paksong District. Each district assigned representatives to the PSC to supervise and advise on project planning and implementation. The PSC provided guidance on implementation and facilitated collaboration among the three districts in the sub-basin. A delineation of functions among national, provincial, and district governments was agreed upon as part of setting up the institutional mechanism.

Develop capacity of the core staff. Training courses were organized to strengthen the capacity of the technical staff at the national, provincial, district, and village levels. At the national and provincial levels, the training was focused on project management and technical concerns. At the district and village levels, the training addressed practical matters of livelihood, regulation development, and basic functioning of the water resources management groups. A learning-by-doing approach was used as a strategy by engaging the core team in key project activities to learn the different strategies and methodologies of implementation. Provincial, district, and village members gained knowledge and skills through direct experience from carrying out the tasks, usually under supervision and as part of a training or induction process. For instance, the local staff were involved in determining water quality by using portable analytical equipment, supervised by the technical staff. After several field activities and practice, the local staff were able to conduct the water quality monitoring by themselves.

Figure 4. Organizational structure of Houay Champi Integrated Sub-basin Management Project.



Determine baseline conditions. Similar to the basinwide approach, a participatory process was employed for gathering baseline information on the Houay Champi sub-basin. The information was assessed and packaged into the Houay Champi Sub-basin Report. Data sheets were prepared and the data collection team was trained in the methodology of data collection, data analysis, and report writing. By engaging the team in data gathering and analysis, the team developed a better understanding of the local situation and was able to appreciate the socioeconomic and environmental dynamics in the sub-basin. The report was reviewed and refined based on data availability and in consultation with the stakeholders at the district and provincial levels.

Develop a management plan. Guided by the baseline report, the Houay Champi Sub-basin Management Plan for 2014-2020 was drafted in collaboration with concerned stakeholders to generate mutual agreement and ownership (Figure 5). The plan was adopted by the three districts and the director of PNREO, encouraging the three districts to cooperate and coordinate in the implementation of the plan. The plan was distributed to potential investors, donors, developers, and other private sector groups in and outside of the Houay Champi sub-basin to generate support for implementation.

Implement the plan. As part of the practical implementation of the management plan, the following major key activities were undertaken (DWR, 2013):

- a. **Set up the water resources management groups at the village level.** These groups were composed of volunteers from the villages and were tasked to monitor the use of water resources in their respective villages. The mandate of these groups was prepared by DWR in cooperation with the Water Resources Section of Champasack Province. This was adopted at the district level and signed by the district governor to provide a legal mandate for resources management. The water resources management groups were established in consultation with the concerned communities in Watouang village (Paksong district); Nongkok (Bachieng district); and Champi village (Sanasomboun district) and endorsed by the district authorities.
- b. **Set up the Water Conservation Fund at the village level.** The fund was set up and accessed by at least 78 families as initial capital for growing cash crops and establishing small-scale freshwater aquaculture. The fund was established by the district governor and provided a startup fund of US\$ 3,000 for each village. A Village Committee was formed to manage the fund and review proposals submitted by

Figure 5. Community-led consultations on the development of management plan.



villagers (Figure 6). Aside from individual loans, the villagers were also able to propose collective activities to protect an area such as river and forest areas where income was being derived. For example, three villages were able to establish four areas for small-scale fish traps. Similarly, each village identified and started protecting forest areas on the riverbanks so as to maintain water level and prevent erosion.

- c. **Develop and disseminate village regulations on water use and supply management.** Through a series of consultations, a set of regulations to protect water sources was developed and approved by the village and district leaders. Billboards were set up in key areas in the villages to inform every one of the permitted and prohibited activities in specific water supply areas (Figure 7). The regulations identified “illegal” activities such as throwing of wastes and chemicals or containers that held fertilizers and pesticides into the river. In addition, cutting of trees along the riverbanks was also prohibited and any development activity required the approval of local authorities. Information on the village fund, including amount, mechanisms, and interest rates, was made available.

- d. **Conduct water quality monitoring.** The DWR collaborated with district and village officials to conduct water quality monitoring along Houay Champi. Three locations were identified for monitoring water levels and four locations for water quality (Figure 8). Initial monitoring was conducted to provide a reference for future management activities. As claims made by villagers of the changes in water levels and quality could not be supported by scientific evidence, management of the water resources was difficult. As such, the monitoring results were shared with decisionmakers and stakeholders not only to increase their awareness, but also to find the best solutions to overcome water quality constraints.

Results

The Houay Champi sub-basin management was guided by the broader implementation and experiences of the SIRBMP. Results arising from the two-year implementation of the sub-basin management included:

- **Better appreciation of a step-wise and gradual approach to river basin management.** The IRBM process as applied in the Houay Champi

Figure 6. Community discussion on livelihood improvement activities at Champi village.



Figure 7. Local regulation posted on a billboard in Nongkok village.



Figure 8. Installation of gauges for water monitoring.



sub-basin was systematic, applicable to stakeholders and staff at different levels of government, and adaptable to community dynamics and priorities. For instance, the experience in implementing the basinwide activities for Sedone guided sub-basin management such as setting up institutional mechanisms for implementation, profiling/state of the sub-basin report, development of management plan, awareness building, and development of regulations.

- **Foundations for IRBM implementation are established at the local and community levels.** With the Houay Champi IRBM Project, the district and village level team members were able to initiate actions in their respective villages, bringing the concept, practice, and

benefits of IRBM closer to those most affected by the calamities of mismanagement. The process of gathering information, collaborative planning, and generating ideas for implementation built community cohesion which was necessary for achieving a shared vision for the sub-basin and for implementing agreed management actions. For instance, in developing the profile and management plans, the implementers themselves were able to gain better understanding of the local situation and interact more with villagers on practical concerns that the project needed to address. This in turn generated trust between the villagers and the implementers.

- **Improved livelihood opportunities for the villagers.** Despite being on its early stage of implementation, access to livelihood opportunities through the revolving fund was one positive result

of the project. Prior to the project, there were no supplemental sources of income and villagers expressed that some of the families were forced to do slash-and-burn cultivation. Apart from having startup capital for small-scale livelihood activities, the village fund served as an “incentive” for the monitoring and protection of water resources. While the project was at an early phase of implementation, villagers expressed that the supplemental source of income was already providing additional food for their families and discouraging slash-and-burn cultivation for many.

Lessons Learned

Multisectoral participation is essential in IRBM, but it takes time. One of the weaknesses of the current setup in sub-basin management was the limited participation of concerned sectors such as the academe and NGO representatives. The process of developing a sub-basin committee took a lot of time. Consultations were needed to get the concerned stakeholders involved. However, the process needed to be initiated and, over time, further improved.

Limited data and information are a constraint, but not a barrier to sub-basin management.

Due to limited studies on the sub-basin, scientific and technical information was inadequate at the district and provincial levels. To address this, the project compiled and analyzed available data and shared and discussed them with the different stakeholders. In preparing the sub-basin management plan, best available information, mostly from secondary sources and testimonies of villagers, were used. The management plan was completed using available information,

recognizing that it needed to be reviewed and updated as more information becomes available during the implementation process.

An incremental and longer-term approach to capacity development makes for a sustainable program.

The strategy for capacity development in the Houay Champi IRBM Project was to train national, provincial, district, and village level officials, based on their specific roles, responsibilities, and capacities over the longer term. Technical training aspects of the project (i.e., water quality and water level monitoring, baseline report development, etc.) were conducted with provincial and national officials, while the practical activities, such as water use management and livelihood development, involved villagers. Limitation of capacity, especially at the district and village levels, was identified as a challenge for the project. However, building competence in capacity development at the provincial level first enabled the province to transfer capacity and assist districts and villages over the longer term. This strategy recognized that the skills for effective planning and management at the local level would take time to transfer and be completely adopted by local communities. The role of the province was to provide training, mentoring, and assistance to the districts and villages to improve management, as may be required, beyond the life of the project.

The SDCA Framework and the processes of the ICM cycle continue to provide the needed working modality for river basin management.

The implementation of the river basin and sub-basin management projects made full use of the ICM concept and working modality. Evidently, IRBM and ICM are both complementary and mutually reinforcing in natural resources management across a wider landscape from river to coast.

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Securing the Drinking Water Supply for the Growing Population of Xiamen City, PR China

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Key Message

- Effective management of freshwater resources across local (subnational) administrative boundaries requires not only close cooperation and collaboration of concerned local governments and line agencies but also the support of academic and research institutions. Such institutions can provide needed scientific data and water quality monitoring information for appropriate public investments and interventions in terms of water supply policy and management measures.
- In securing continuous freshwater supply to meet the growing population demand, scientists in Xiamen collectively demonstrated their indispensable role in water resource management decisions.

Abstract

This case study is aimed at demonstrating an ongoing comprehensive and science-based water supply management initiative to determine the amount and quality of safe drinking water for the growing population of Xiamen City and other sub-urban areas. Also highlighted are the integrative approaches in water management of the Jiulong River system especially in coordinating the relevant cross-boundary municipalities, agencies, and users. The case study underscores the importance of science in assisting management decisions particularly in water quality monitoring, water safety and allocation across boundaries, as well as in information management. It also elaborates the need to improve the existing methodological approach to increase scientific reliability in prediction modeling. Lessons learned from water supply management initiatives are also presented.

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Background

Main issues of drinking water supply for coastal cities

Global population is set to increase dramatically within the next 30 years, up to a staggering 9.6 billion by 2050 (UN, 2013). With a great majority of the population residing in coastal cities, particularly in developing countries (Lutz and Samir, 2010), the demand for clean and safe drinking water supply would be a key challenge to sustaining the urban population. Most developed coastal cities lack freshwater resources largely due to relatively limited water catchment areas. In China, many cities have to rely on water supply from adjacent inland watersheds. Such a situation often gives rise to transboundary distributional challenges, affecting both quantity and quality of water.

Unregulated human settlements and economic activities within a watershed area are often found to degrade the quality of freshwater resources. Overfertilization of agriculture farms and discharges from animal and domestic wastes, which are often inadequately treated, lead to nutrient (mainly nitrogen [N] and phosphorus [P]) enrichment in receiving waters; often resulting in eutrophication and algal blooms. In addition, persistent organic pollutants (POPs), heavy metals, and other pollutants from both point and diffused sources, threaten water security for coastal city populations.

Furthermore, a large number of dams have been constructed worldwide (China included) along river channels for hydropower generation, flood control, irrigation, and to a certain extent, for tourism development (Miao, et al., 2015). However, intensive

dam construction can drastically change river hydrology and biogeochemistry and thus create negative impacts on the river ecosystems (Kelly, 2001; Vörösmarty, et al., 2003). One of the most direct consequences for cities located downstream is the reduction of freshwater supplies from the upper reaches of major rivers.

In the context of increased human and climatic perturbations, freshwater supply—or the lack thereof—is already an urgent coastal management challenge. The lack of scientific understanding of pollutant emission and transport, limited investment in pollution mitigation, and inadequate monitoring of water quality continues to hinder the sustainable management of water resources (Jia, et al., 2010). The lack of comprehensive data on watershed-river-reservoir and on quantity and quality of receiving waters in urban coastal areas also severely affects the effectiveness of the design and implementation of water resources management programs. For rapidly developed coastal cities like Xiamen, availability of appropriate scientific information and management tools was essential to address freshwater resource management concerns, especially those across administrative boundaries.

Geophysical characteristics of Xiamen and water supply challenges

Xiamen, historically known as Amoy, is a major city on the southeast (Taiwan Strait) coast of Fujian province, the People's Republic of China. Xiamen has an area of 1,699 km² and a population of 3.81 million by the end of 2014 (XBOS, 2015). Xiamen comprises Xiamen Island, Gulangyu Island, and part of the rugged mainland coastal region from the

Figure 1. Jiulong River Basin showing various monitoring sites. Arrow shows water transfer from source (Jiangdong reservoir in the southern part of North River) to Xiamen City.



left bank of the Jiulong River in the west to the islands of Xiang'an in the northeast. It borders Quanzhou City to the north and Zhangzhou City to the west. The city previously centered on Xiamen Island but expanded to include four other districts: Haicang, Jimei, Tong'an, and Xiang'an on the mainland.

Xiamen has a monsoonal subtropical climate, characterized by long, hot, and humid summers and short, mild, and dry winters. Typhoons normally occur in late summer and early autumn. The annual rainfall is 1,350 mm. However, rapid urbanization, population growth, and climate change in recent years

were posing water supply challenges to meeting increasing demand for safe and clean drinking water. Total water supply increased sharply from 295 to 419 million m³ in 2009–2014 (XBOS, 2010, 2015). Furthermore, the majority of water supply was from the Jiulong River rather than a local source. The Jiulong River is the main river system running through several districts before entering Xiamen coastal seas. It provides Xiamen City 168 million m³ of water per year through a transport tunnel that was constructed in 1972 (Figure 1), accounting for over 80% of the total water supply. Other major water sources for suburban area are Tingxi reservoir and Bantou reservoir located north of Xiamen Island.

Three tributaries (North River, West River, and South River) discharge water into Xiamen Bay. The North Jiulong River is the main tributary with a drainage area of 9,570 km² and a mean annual discharge of 8.23×10^9 m³. The length of the main tributary to the water intake point at Jiangdong is about 274 km. Land use includes 78% forest (mostly secondary), 16% arable land, 3% urban and residential land, 2% water, and 1% bare or grassland (2007 Landsat Thematic Mapper image). Over 100 hydropower dams were constructed within the Jiulong River Watershed (Wang, et al., 2010).

Four cities/counties (Longyan City, Zhangping County, Hua'an County, and Changtai County) and a part of Zhangzhou City are located in the watershed area. The total population is 1.5 million, 43% of whom live in the urban areas. Longyan City, which is located in the upstream area, recently experienced a rapid increase in animal farming activities. The other counties are predominantly covered with agricultural and forest land, and relatively of low population with the exception of the more densely populated Changtai County and Zhangzhou City in the downstream area.

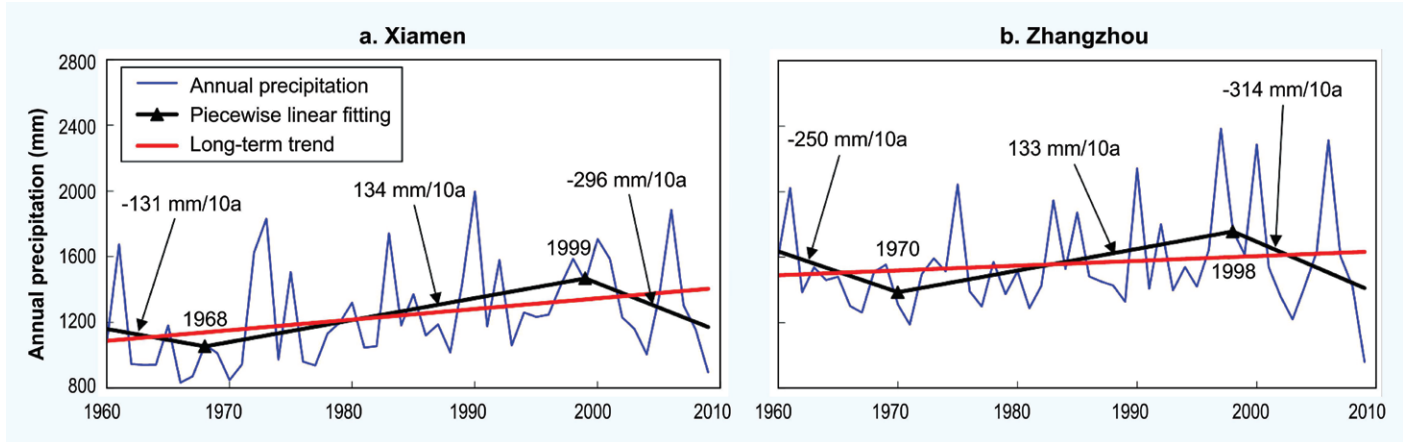
Current scientific knowledge and management implications

Climate change and its impact on water resource availability

Based on a 50-year (1960–2009) daily dataset of temperature and precipitation at two national meteorological stations (Xiamen and Zhangzhou), the characteristics and long-term trends of climate change were analyzed using the Piecewise Linear Fitting Model (PLFM) (Tomé and Miranda, 2004). The results showed that the annual mean air temperature at Xiamen and Zhangzhou generally increased from 1960 to 2009 by 0.225°C and 1.475°C, respectively. The “warm winter” phenomenon was especially evident in the last 30 years. Precipitation at Xiamen and Zhangzhou showed overall increases during summer. However, precipitation decreased significantly by 20% in the last decade (Figure 2). The occurrence and intensity of extreme climate events such as hot day (>99%), storm day (daily rainfall > 50 mm), and drought day (without any rainfall) significantly increased. The climate in these two areas showed a general trend of “warm and dry” in winter, but with increasing rainstorms in the summer. Given the close link between climate and hydrology, the climate change trends were likely to pose adverse impacts on water resource availability to Xiamen City due to the increased seasonal and interannual variation. Such analysis provided a basis for developing adaptive management strategies in response to climate change in the region.

Nutrient enrichment and eutrophication (algal bloom) threaten water quality

Increasing human activities and external nutrient loads over the past 30 years were the main causes of water degradation and

Figure 2. Precipitation trends in Xiamen and Zhangzhou (1960–2009).

eutrophication (Chen and Hong, 2012; Chen, et al., 2013). A significant decline of N:P ratio was observed in both river and estuarine waters since the 1990s due to relatively high P loadings, a consequence of waste discharges from the proliferating husbandry of livestock and the application of excessive phosphate fertilizers to cash crops. Continued nutrient enrichment and decline of N:P ratio changed the nutrient stoichiometry and supply ratio in waters, in turn increasing the risk of nutrient-enhanced algal blooms. According to current findings on eutrophication and harmful algal bloom processes, a dual nutrient (N and P) management strategy was necessary to manage the water quality in the Xiamen Bay-Jiulong River Basin. Focus needed to be on reducing animal wastes in the north Jiulong tributary and mitigating overfertilization in the west Jiulong tributary (Chen, et al., 2013).

Three algal bloom events were monitored in the north Jiulong River since 2009, which threatened Xiamen's drinking water supply. The main reason for the algal blooms was the excessive nutrient loading from human and animal wastes, and agricultural runoff accumulated in dam reservoirs with limited removal (Li, et al., 2011; Chen et al., 2014).

However, phytoplankton communities change seasonally, associated with river discharge, irradiance, water temperature, and nutrient concentrations (Tian, et al., 2014). The local government was informed by scientists of the perils of nutrient pollution. A number of management initiatives were implemented since the late 1990s with limited success due to the lack of holistic planning and integrative management measures given the complicated socioeconomic and political situation in PR China (Peng, et al., 2013).

Approach and Methodology

Developing a watershed water information system

A water security program was initiated in 2009 and completed in June 2012. It addressed key drinking water issues, including contamination at source. Funded by the Xiamen government, the Jiulong River Watershed Information System (JRWIS) was developed by Xiamen University in collaboration with Fujian Strong Software Company and Xiamen Environmental Monitoring Central Station.

The JRWIS included a multisource database (meteorological data from 10 stations, hydrological data from 7 stations, water quality data from 11 provincial control stations, and 4 automatic water quality stations) based on SQL2005 and ArcSDE, using Web Geographic Information System, remote sensing, and GPS technology. A coupled model (SWAT+EFDC+WASP) was also integrated into JRWIS to simulate river discharge and water quality (e.g., ammonium, total nitrogen [TN], total phosphorus [TP], dissolved organic P, and chemical oxygen demand [COD]). The spatial database included administrative maps, remote imagery, digital elevation model (DEM), soil map, and land use/cover. Monthly water quality monitoring data was easily imported, while in-situ sensor data from buoys and automatic monitoring stations were transferred and imported to the database in real time. Discharge data (flow rate) released by the China Ministry of Water Resources and rainfall/temperature/wind data released by the China Weather Bureau were also linked to JRWIS. In this setup, the database of JRWIS could be easily updated.

The JRWIS provided various function modules, including data acquisition, data management and editing, data query and plotting, map query, water quality assessment, early warning of water quality, and model simulation. The JRWIS was provided with a user-friendly interface and visualization screen, which made it a useful tool for improving water resource management.

Results

The JRWIS was installed in April 2011 and operated and managed by the Xiamen Environmental Information Center. It was a Web-GIS system that enables users to log in and use the system anywhere and anytime provided that there were available Internet access and computer services. The system was also

accessible to other related agencies such as the North River Water Transfer Office, the Xiamen Water Affairs Group, and environmental monitoring stations in upstream cities (e.g., Longyan, Zhangzhou), as well as the provincial Environmental Monitoring Central Station in Fuzhou City.

The JRWIS was the first effort in China to develop a robust, comprehensive, and fully coordinated surveillance and monitoring system for water quality. The main applications of JRWIS included:

1. Water quality parameters (e.g., dissolved oxygen, pH, nutrients, chemical oxygen demand, and chlorophyll) could be monitored through data query and plotted. Users easily assessed the water quality situation and spatial and temporal variations. Real-time data over the previous 24 hours were shown at the touch of the screen.
2. Timely and accurately prepared evaluation reports of water quality, including monthly, seasonal, and annual variation could be accessed. National or local water quality criteria were also incorporated, and an evaluation could be made based on various templates. According to users from the Xiamen Environmental Monitoring Center Station (XEMCS), JRWIS was much better in terms of data accuracy, time, and efficiency compared to traditional manual approaches.
3. An unhealthy water quality could be detected before reaching the distribution system. This enabled the concerned agency to alert the public and undertake appropriate remedial measures. A case in point was an incident detected by scientists from XEMCS using the information from JRWIS. They noted that values of dissolved

Figure 3. Model output shown on the JRWIS. A coupled model (SWAT+EFDC+WASP) was integrated into JRWIS to predict water quality. (This modeling work was completed by Dr. J. Huang of Xiamen University.)



oxygen (DO), pH, and chlorophyll from an automatic monitoring station (Jiangdong reservoir) kept rising from the afternoon of 13 March 2013 until the next morning. Recorded data showed that DO had gone up to 21.22 mg/L, pH rose to 9.96, and chlorophyll content reached 119.6 mg/m³ (a typical set of conditions for a possible algal bloom). The scientists checked the data from three other automatic monitoring stations (Xipi, Punan, and Luobin) in the upper reaches and found that a nearby station (Luobin, located in a tributary close to Jiangdong) also had a high chlorophyll value of 55 mg/m³. This

important information was delivered to the North River Transfer Office and the Xiamen Water Affairs Group. The manager of the North River Transfer Office decided to increase dam outflow to mitigate an algal bloom. A total of 3 million m³ of water was discharged on 14 March (1900–2100H), and another 520,000 m³ on 15 March (1830–1900H). Following these interventions, water quality recovered, meeting the national water criteria. The coupled model (SWAT+EFDC+WASP) simulated river runoff and water quality to verify and assist management in deciding the release of dam water (Figure 3).

Lessons Learned

Given the complex ecological processes occurring in each aquatic ecosystem and the diverse socioeconomic conditions, interdisciplinary research and model prediction have become essential to provide scientific information that will be useful for effective water management. The JRWIS initiative was the first step in the right direction.

The JRWIS was proven to be a useful science-based information system which could serve as an interactive platform available for a variety of users to monitor and manage water quality. It was flexible in configuration so that users could add monitoring station(s) and data, when needed. However, accurate and highly precise measurements, expanded monitoring coverage coupled with high precision modeling were still needed to strengthen more effective assessments.

At present, automatic measurement of water quality is limited to (a) a few monitoring stations (only four stations in such a large catchment); (b) a few parameters (TN, TP, ammonium, COD, etc.); and (c) limited monitoring frequency (every four hours for TN and TP). Current national criteria for water quality do not cover other important contaminants (e.g., pathogenic microorganisms, emerging pesticides, veterinary drugs, and other POPs) that also threaten water quality and human health. There is a lack of precise bathymetry data which are necessary for developing a high-precision hydrodynamic model. In addition, several key coefficients for model input parameters have not been validated because of limited biogeochemical observations. Hence, further work is necessary to ensure that predictive models can contribute more effectively to management decisions. The JRWIS should be further expanded from North

River to include other major water sources like the Tingxi, Bantou, and Lianhua Reservoirs in Northern Xiamen. With a growing database, the information system will be further enriched.

The initiative of the Xiamen City government reflected much needed cross-boundary cooperation and collaboration with concerned local governments and line agencies as well as expertise from academic and scientific institutions in developing the database and information system. These efforts helped in the administration of appropriate management measures. The local government has good experience in application of a holistic and integrative management approach in addressing coastal management challenges and the capacity to continue building the information system.

This case study also demonstrated a working model for scientists to contribute to the process of policy and management decisionmaking by providing reliable information and sound scientific advice.

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Safeguarding the Vulnerable Communities of Xiamen's Western Sea Areas

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Key Message

- In coastal management practice, the cost bearers and beneficiaries of a policy or program belong to different sectors of the population. Therefore in the process of policy development, special attention needs to be paid to those sectors that experience net costs or other negative impacts compared to just those who experience net benefits or positive impacts.
- Access to an impartial and fair compensation scheme for losses and damage by vulnerable households and communities is an essential aspect of coastal development projects as demonstrated in Xiamen's Western Sea areas.
- A lead group with high authority and coordination capacity is imperative in the design of a compensation scheme, in that the scheme involves many challenging issues that need the cooperation and collaboration of various concerned government agencies and stakeholders.

Abstract

This case study presents the rationale, approach and justification for safeguarding the interests of vulnerable communities while implementing the Integrated Improvement and Management of the Western Sea Areas Program (IIMWSAP) in Xiamen. The socioeconomic benefits and equity effect were first assessed, followed by an analysis of the effects of the compensation scheme on the vulnerable communities. The case study highlights the results of the analysis of the outcomes, experience, and lessons learned from the implementation of the program. These experiences are very important to coastal cities in PR China implementing the marine functional zoning schemes, which unavoidably could impact the welfare of the mariculture farmers and other users.

Background

Integrated coastal management (ICM) is an effective approach for solving sea area use conflicts, protecting ocean and coastal

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environment and the ecosystems therein, and promoting the efficient use of marine resources. If the benefits of an ICM program are greater than the costs, the implementation of ICM is considered economically viable and such program is expected to enhance the welfare of the whole society. However, in practice, the implementation of an ICM program may also imply reallocating marine resources in terms of use and space. Public policies have “distributional effects” that can affect different segments of the population (e.g., income groups, race, sex) and the economy (e.g., agriculture, manufacturing, etc.). Those who bear the costs of a policy or program and those who enjoy its benefits may not be the same people.

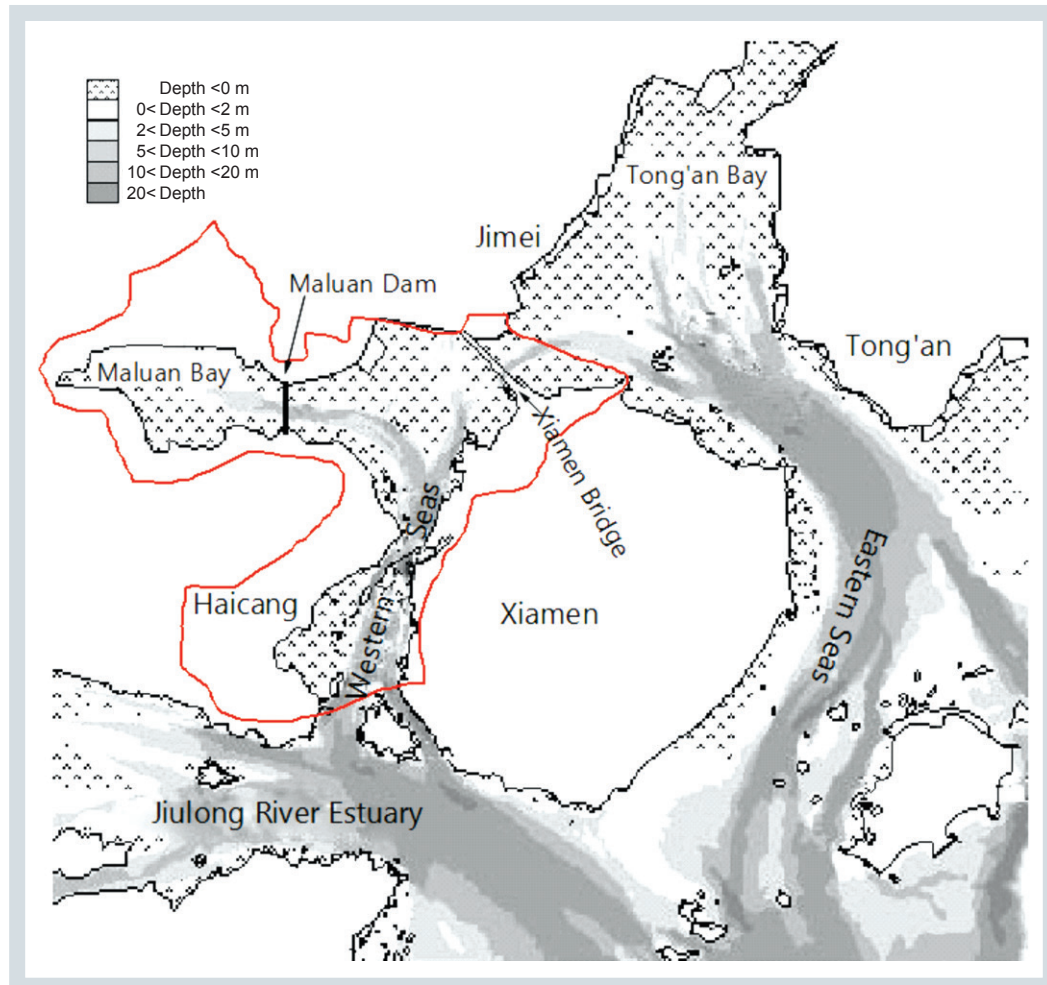
Thus, equity assessment must be conducted to examine the magnitude as well as the distributional effects of the ICM program on sectors, especially on those disadvantaged or vulnerable communities. Equity assessment provides decisionmakers a better understanding of the economic effects of a policy or program and should enable them to develop a more appropriate compensation scheme (NCEE, 2014).

The Western Sea areas (WSA) surround the western part of the island city of Xiamen where development was characterized by rapid industrialization, urbanization, and population growth during the past three decades, with consistently high economic growth. Such development resulted in more diversified and intensified utilization of natural resources in the sea area. Competing and conflicting uses of the coastal and marine space were severe among different users, especially transportation and aquaculture. In addition, large-scale land reclamation led to a 58% loss of sea area, significantly altered the shoreline, polluted the coastal environment, seriously destroyed the natural ecosystems, and depleted tourism resources.

According to the marine functional zoning (MFZ) scheme, the designated dominant function of the WSA was for port and transportation development while tourism and protection of endangered species could be accommodated as the secondary function (Fang and Ma, *this volume*). However, at that time, most of the sea areas were already densely covered by floating cages and oyster rafts, which hindered navigation and future transportation development. Management interventions became necessary to ensure compliance with the MFZ scheme. Hence, in 2002, the Xiamen City government initiated the IIMWSAP with due consideration of the planning requirements of the zoning scheme.

The geographical extent of WSAP covered 77 km² of the water area and 60.7 km² of adjacent land area (Figure 1; OMO and POITWS, 2011). The objectives and the key projects of the program included:

1. Maluan Bay – to improve the hydrological condition, increase the tidal influx, and then significantly improve the water quality of Maluan Bay through dredging and opening up Maluan Dam, which was built in the 1970s. The water area would increase from 3 to 8 km² after the completion of the project and the area around Maluan Bay would be transformed from a dominantly agricultural area into a sub-center of the city.
2. Mudflat around WSA – to restore the coastal ecosystem by replanting mangroves; increase the space for tourism by enlarging the water area; restore natural habitats of uninhabited island; construct harbors for tourists; and create more land for urban development through restrictive coastal reclamation.
3. Shoreline around WSA – to increase the shoreline for harbor/port and tourism development by integrating and transforming

Figure 1. The geographic extent of IIMWSAP.

existing shoreline use through improvement of seaside scenery and natural habitat restoration and management as well as through increasing coastal land area for urban development.

4. Water quality of WSA – to construct a waste water collection system and sewage treatment plant for reducing pollutant discharge into the Western Seas to improve its environmental quality.
5. Relocation of mariculture practices – to implement the MFZ scheme by removing floating fish cages and rafts for oyster and

mussel culture in the area; reduce use conflicts between shipping and mariculture practices; and reduce pollution caused by these mariculture practices; and thereby achieve efficient use of marine resources and improve scenery of the Western Sea areas.

Approach and Methodology

First, this study estimated the socioeconomic benefits of IIMWSAP under different discount rate scenarios by identifying and quantifying the benefits and costs of impacted sectors

following the standard framework for benefit-cost analysis (BCA) (Boardman, et. al., 2006). Next, the subpopulations likely to be affected by the program were identified. After which the costs and benefits estimated for the BCA were disaggregated to conduct the distribution effects and equity assessment of the IIMWSAP. According to the above assessment, the vulnerable groups or communities that would be seriously affected by IIMWSAP were identified. Lastly, the methodology for developing compensation measures appropriate to the local conditions was developed.

It must be pointed out that ICM programs could result in uneven distribution of benefits and costs over time, perhaps spanning several generations. This intergenerational equity effect is, however, not included in this case study.

Results

1. **BCA.** By achieving the above project objectives, the IIMWSAP would greatly improve the shipping traffic of the WSA and the corresponding port industry by: increasing deepwater port for bigger vessels; reducing siltation; minimizing sea use conflicts; restoring coastal ecosystems; increasing scenery sites for tourism development; and creating more and high-valued coastal land area for real estate development. The above projects would require a large amount of financial investments. A thorough analysis of the financial implications and socioeconomic benefits under different discount rate scenarios was conducted by identifying and quantifying the benefits and costs to impacted sectors.

Table 1 shows that the net benefits of IIMWSAP were RMB 6.2 billion (US\$ 976 million) with the benefit-cost ratio of 1.77 under a discount rate of 4.5%. Even with a high discount rate of 9%, the net benefits reached

RMB 3.38 billion (US\$ 532 million). From the standpoint of the whole society, the program would be economically efficient.

2. **Distribution effect on vulnerable groups.** The BCA showed that the implementation of the program would improve the welfare of the society. But BCA gains and losses were weighted equally regardless of to whom they accrued (NCEE, 2014). In practice, cost bearers and beneficiaries of a policy or program belong to different sectors of the population. In the process of policy development, more attention should be paid to those sectors (subpopulations) that experience net costs or other negative impacts than to those who experience net benefits or positive impacts. Of particular importance was the identification of vulnerable communities, whose livelihoods might be seriously affected, in order to develop appropriate compensation measures.

Table 2 lists the benefits and costs of each sector (subpopulation) affected by the IIMWSAP. In this program, benefits and costs to four categories were analyzed: business, farmers, government, and the general population. Implementation of the program would provide more space and resources for the development of port and transportation, tourism, and real estate. The investors and employees of these industries were the beneficiaries of the program. Their net benefit was calculated at RMB 2.57 billion (US\$ 404.2 million). All the citizens of Xiamen would be the beneficiaries as a result of environmental improvement. Although the benefit to government was negative, it could benefit from the increase of taxes arising from the economic development. Mariculture farmers in the WSA were the most adversely affected. They lost their main production resources, the mariculture sea area on which their livelihoods mainly depended. They could not also benefit from other new

Table 1. Benefits and costs of IIMWSAP (in RMB million).

	Discount rate =2%	Discount rate =4.5%	Discount rate =9%
Benefits			
Economic sectors			
Port and shipping	773.9	572.55	348.44
Tourism	1,872.89	1,388.24	848.86
Real estate	8,245.01	6,630.17	4,569.72
Sub-total	1,0891.8	8,590.96	5,767.01
Environmental sectors			
Increased carrying capacity	218.96	161.5	97.63
Amenity value	1,182.6	880.32	542.6
Scenery value	1,916.31	1,502.4	1,023.68
Habitat	1,532.37	1,130.3	683.29
Increased property value	2,426.23	1,930.12	1,354.49
Decreased external cost	30.96	22.61	13.37
Sub-total	7,307.43	5,627.25	3,715.06
Total	18,199.22	14,218.2	9,482.07
Cost			
Cost of policy	21.21	17.71	13.56
Engineering cost	6,892.15	6,019.86	4,771.71
Compliance cost	1,983.32	1,530.26	1,007.99
Social costs	558.73	444.75	312.48
Total	9,455.41	8,012.58	6,105.74
Net benefits	8,743.81	6,205.62	3,376.33
Benefit-cost ratio	1.92	1.77	1.55

Data source: ESRC (2005)

economic opportunities of the program because of their low financial capability and low education levels. At the same time, they were made to undertake the costs of the program, including the compliance cost resulting from MFZ scheme in terms of the loss of aquaculture facilities and juvenile fish, the loss of income from mariculture practices, and the high social costs resulting from unemployment.

Before 2002, there were 55,154 floating fish cages, 306 ha of floating rafts for oyster and

mussel culture (rope culture), and 1,543 ha of mudflats used for bivalves culture (bottom culture) in the WSA. A total of 6,639 families and 17,337 laborers were involved in various forms of mariculture practices, which accounted for 60% of the total labor force of the coastal fishing villages in WSA (ECC, 2002). The implementation of the program resulted in the loss of income of the fish farmers amounting to RMB 132 million per year (US\$ 20.8 million). The costs of the mariculture farmers were estimated to reach RMB1.97

Table 2. Distribution of benefits and costs of IIMWSAP (in RMB million).

	Business	Farmers	Government	All people
Benefits				
Economic benefits	8,590.96			
Environmental benefits				5,627.25
Cost				
Cost of policy			17.71	
Engineering cost	6,019.86			
Compliance cost		1,530.26		
Social costs		443.31	1.44	
Net benefits	2,571.1	-1,973.57	-19.15	5,627.25

Discount rate = 4.5%

Data sources: Personal calculation according to ESRC (2005)

billion (US\$ 310 million), accounting for about 25% of the total cost of the program. They would be the communities most affected by the program if a well-designed compensation scheme was not implemented.

- 3. Compensating the vulnerable communities of WSA.** In WSA, the mariculture farmers were not well-organized and were less capable of representing their own interests. They were economically disadvantaged or vulnerable due to their relatively low income. In order to safeguard the interests of the aquaculture farmers and to reduce net loss of their welfare, the Xiamen City government developed a set of compensation schemes to minimize the equity effect of the program.

3.1 Developing the compensation scheme

- a. **Establishment of a lead group with authority to make decisions.** A lead group for the program was set up to coordinate key actions

of the program. The executive deputy mayor was appointed to serve as the director of the program assisted by two deputy mayors in charge of marine affairs and planning, while a deputy director of Xiamen People's Congress and a vice chair of Xiamen Political Consultative Committee served as deputy directors of the lead group. Other members included the directors of related city government agencies and the heads of the related districts (Figure 2). The organizational structure ensured effective coordination in making appropriate decisions on all aspects of the program including the related compensation scheme.

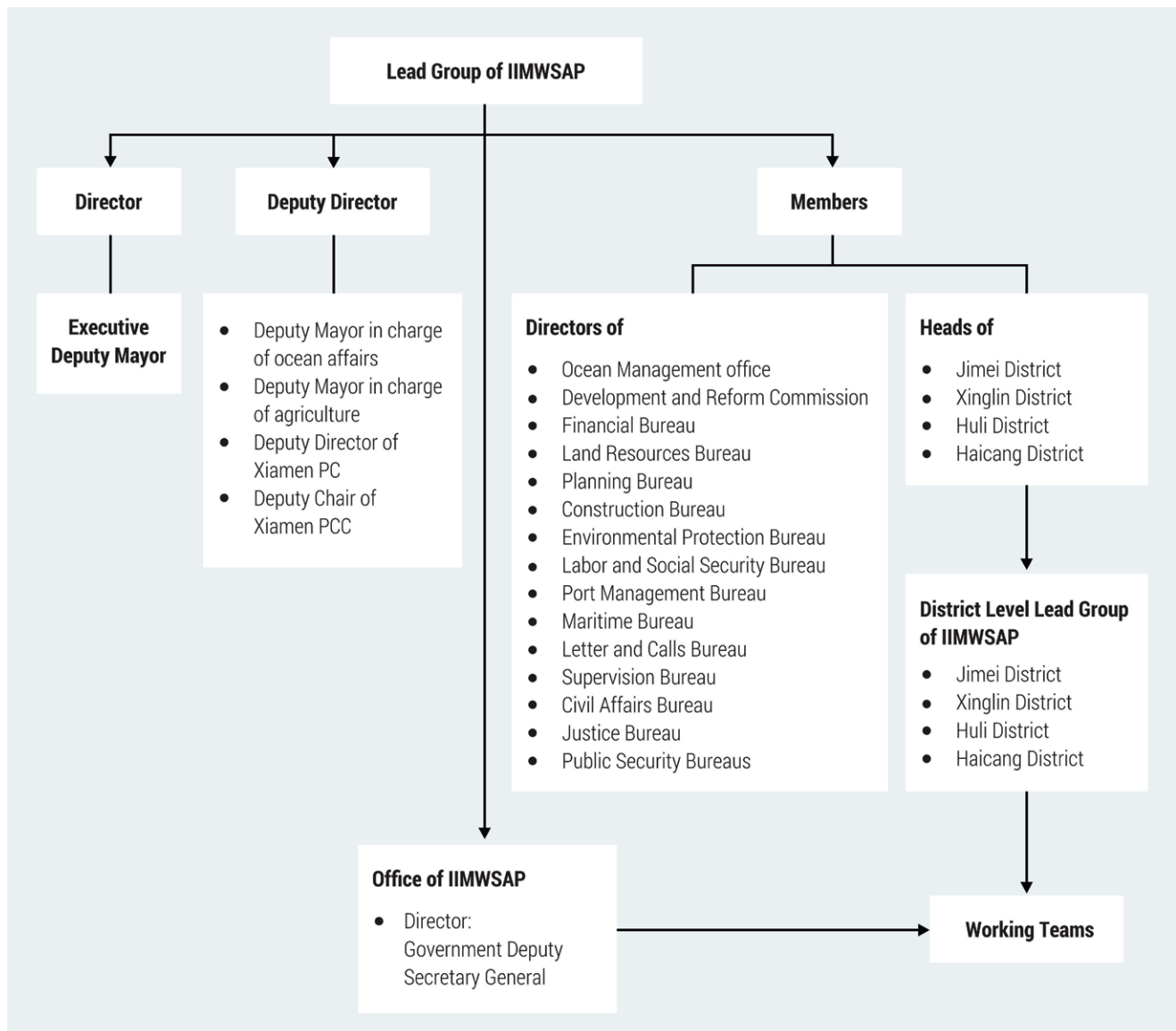
The impacted districts, Xinglin, Jimei, Huli, and Haicang, also established corresponding lead groups, which organizational structure was similar to that of the city level with the head of each district playing the leadership role. Every district set up working teams to investigate the loss of mariculture practices, to collect the claims of farmers,

and to design the appropriate compensation standard and address issues arising from daily activities involving compensation scheme implementation.

- b. *Designing an equitable and transparent compensation scheme based on the outcomes of field surveys.* The working teams went to every affected village and visited every affected household to explain and promote

the objectives of the program to secure understanding and support of the affected fish farmers. The members of the working teams stayed with the fish farmers for one year and surveyed the cultured species, areas, revenues, and costs of the mariculture practices in different seasons to more accurately assess the loss of mariculture practices resulting from the implementation of the program. The draft compensation scheme

Figure 2. The organizational framework of the lead group of IIMWSAP.



was then developed based on the results of the investigation. Although there were no outright representatives of the fish farmers in the working teams, the draft compensation was circulated to the community, calling for opinions of the stakeholders through public hearings and other roundtable meetings. The transparency of the process was ensured, and a special telephone hotline was made available to receive public complaints.

The lead group of the program adopted a dynamic and pragmatic approach in addressing the concerns of the affected fish farmers. For example, after the announcement of the implementation of the zoning scheme, many fish farmers were worried that they would suffer serious financial losses due to large supply of farmed fish flooding the market. Such concerns were mitigated by encouraging the purchase of farmed fish by government officials and citizens, tax preferences for those firms buying the fish from WSA, disseminating information, and expanding the sales channels, etc. The compensation scheme was finalized after close consultation with the concerned vulnerable communities.

3.2 Implementing the compensation scheme

In general, government can mitigate the decreased household and business incomes by reducing tax revenues and increasing expenditures on income security programs (the automatic stabilizer effect), employment training, food and housing subsidies, and other fiscal line items. Despite the above considerations, the compensation scheme for the fish farmers was finally implemented covering the following components:

- a. **Cash subsidy.** The scheme compensated losses arising from the removal of mariculture facilities and the disposal of fingerlings or juvenile fish as well as other revenue losses resulting from the program. The losses of different mariculture facilities were calculated based on investment, durability, and depreciation. The losses of mariculture profits were estimated according to cultured species, their market prices, and costs. The losses due to the disposal of juvenile fish were estimated according to their market price. All estimates were based on the findings from the field survey. The compensation standard was the sum of losses from aquaculture facilities, disposal of fingerlings or juvenile fish, and profits for two years. In total, the cash compensation reached RMB 211.54 million (US\$33.3 million). This was shared by city and district public finance according to an agreed ratio of 7:3 (i.e., the city level financial department shouldered 70% of the compensation expenditure, and the rest by the district financial department).
- b. **Policy support to rural industries.** The program facilitated the restructuring of local industries in WSA through a set of policies and incentives to support rural economy including tax exemption, land preference, and financial support to projects invested by the impacted fish farmers. The city and district finance bureaus allocated RMB 15 million (US\$ 2.4 million) budget to establish a special fund for supporting the development of rural economy for the displaced fish farmers. Also, each government agency was asked to provide technical support to the fish farmers' project.
- c. **Policy on employment.** Considering the low education level and low labor skills of the fish farmers, the government initiated free training programs to promote their competitive ability in the labor market to enable them to find alternative jobs. More job opportunities were made available for the affected fish farmers. For example, public service appointments such

as those related to sanitation and security were prioritized for fish farmers at the age of 45 and above. Public and private companies were also encouraged to employ the impacted fish farmers.

- d. **Minimum living standard.** Before 2002, the minimum living standard system adopted in Xiamen did not cover the fish farmers. The lead group therefore decided to include all the affected families in the system. As such the minimum living standard of the fish farmers was the same as the city's standard, comparatively higher living standards than in other rural areas. The required budget was covered by the city finance. The policy ensured that the affected fish farmers were able to meet basic living standards.

defuse social complaints and smoothen the process of ICM program implementation.

3. Cash compensation was an effective approach to directly reduce the losses of the concerned community, while enhancing the financial ability of alternative livelihoods or starting new businesses. Enhancing skills through employment training and providing job opportunities were also important elements for transforming the affected fish farmers as skilled workers in the rural industries.
4. Xiamen's experiences can be adapted to conditions in other coastal cities implementing the MFZ scheme under the ICM framework. However, not all coastal cities have the same financial capability as Xiamen to compensate affected communities and households in cash. In such cases, appropriate policy to accord land use preference and to enhance business opportunities can be considered. Innovative institutional arrangement to endow property rights of sea area to fish farmers can be an effective approach to encourage them to invest in and benefit from the new industries/enterprises.

Lessons Learned

1. It is very important and necessary to check the "distributional effects" of an ICM program and integrate this consideration into decisionmaking process. Compensating the vulnerable communities of an ICM program was an essential way to ensure social justice and to secure the continued support of the public.
2. A lead group with high authority and coordination capacity is imperative in the design of a compensation scheme. The scheme involved many issues (such as land, finance, environment, tax and employment), which needed the cooperation and collaboration of various government agencies. Transparency, fairness, sufficient consultation, and concerns over the interest of the vulnerable group were essential principles for the development of compensation scheme. Promptly solving the reasonable claims of vulnerable groups was very important to

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Community-based Crab Conservation in Chonburi, Thailand: Engaging Local Fishers and Communities in Marine Conservation

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Key Message

The success of blue swimming crab conservation as experienced in Chonburi Province of Thailand is largely due to:

- linking conservation with food security and livelihood of the local community;
- increased understanding and realization of the rights, role, and responsibility of the local fishers and coastal communities to ensure sustainable supply of marine resources; and
- committed local political leadership to effectively promote partnerships among government, stakeholders, and other interest groups in leveraging human and financial resources to replicate and scale up conservation efforts throughout the province.

Abstract

The blue swimming crab (*Portunus pelagicus*) is among the important local and export commodities of Chonburi, and is a key source of livelihood for local fishers. However, the harvest was continuously declining in the late 1990s as a result of overharvesting, environmental degradation, and use of advanced fishing equipment.

As part of the integrated coastal management (ICM) program of Chonburi Province, a crab conservation project was implemented focusing on the following:

- increasing the roles and responsibilities of local fishers and communities in marine conservation;
- protecting the gravid females (i.e., crabs with eggs) to enhance production (i.e., protecting the “mother” [broodstock], as opposed to the conventional approach of protecting the young); and

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- educating fishers and the public by engaging them in the protection and conservation of marine and coastal resources.

The key processes included: (1) gathering female crabs with eggs and holding them in submerged cages; (2) securing the cooperation of fishers to temporarily “surrender” gravid female crabs to the project until the eggs were released to the surrounding water; and (3) returning the crabs to fishers and monitoring crab harvests over time. This project was first implemented by Sriracha Municipality to demonstrate its feasibility.

Over the years, increase in harvesting of crabs was observed since the crab conservation program started in 2006. This translated to better income and improved livelihood for the local fishers.

Since then, the crab conservation project was replicated and incorporated into the local development plans and budgets of seven other local governments in Chonburi Province, including the municipalities of Saensuk, Sathahip, Laemchabang, Bang Phra, Banglamung, and Bang Sarae as well as Pattaya City.

The outcome of the crab conservation projects in Chonburi were: (a) increasing understanding, appreciation, and ownership of the local stakeholders; (b) improving local capacity in marine resource management; (c) creating local platforms for public education and engagement on marine conservation; (d) leveraging and facilitating technical and financial assistance for replications in other coastal areas; and (e) integrating or mainstreaming crab conservation into local development plans.

Background

Chonburi Province is a popular destination for local and foreign tourists for its scenic

beaches, fresh seafood and proximity to cosmopolitan Bangkok (Figure 1). Over the past 30 years, Chonburi has undergone economic transformation, from agricultural to industrial, as a result of a national policy to develop the eastern region of the Gulf of Thailand through the implementation of the Eastern Seaboard Development Project.

In the late 1990s, the adverse environmental impacts of rapid development of the Eastern Seaboard, including Chonburi Province, were recognized by both the government and the people of Thailand. About the same time, the national government’s decentralization policy was officially adopted providing local governments with the opportunity and responsibility to manage their environment and natural resources therein.

An ICM demonstration project was initiated in Chonburi Province in 2001 involving five municipalities, including Sriracha, which hosted the ICM project office. A provincial-wide Coastal Strategy was adopted in 2004, with Sriracha, subsequently, adopting a medium-term implementation plan (ICM Action Plan) with the blue swimming crab conservation as one of the priority projects.

The blue swimming crab is an important local commodity in Chonburi in high demand among locals as well as tourists. In 1998, the harvest from the Gulf of Thailand reached a peak of 37,281 tons, from 18,708 tons in 1985. Harvest then continuously declined from the late 1990s to 15,132 tons in 2009 (Vanguard, 2012, cited in Thai Health Promotion Foundation, 2012). The decline was associated with overharvesting and environmental degradation arising from unregulated coastal development. Local fishers and commercial operators, including those from Chonburi Province, were using collapsible bottom traps and floating seines, which captured the mature and gravid crabs, and even the young

Figure 1. Chonburi Province is located in the eastern seaboard of the Gulf of Thailand, south of Bangkok.



ones. Some of the fishers were relying primarily on the crab harvest and this significant decrease in the population of the blue swimming crabs was affecting their income and threatening their livelihood.

This case study highlights the efforts of the local governments in Chonburi in addressing their marine conservation challenges by using the

conservation program of blue swimming crabs to demonstrate the solutions to overharvesting and environment degradation through increasing public awareness, stakeholders' participation, and sharing of responsibilities. The success of the program was also attributed to a leader who understands and champions the cause of the fishers and the importance of marine conservation (Box 1).

Box 1. An ICM champion.

Mr. Chatchai Thimkrajang, former mayor of Sriracha Municipality, played a critical role in the establishment and implementation of the ICM program in Chonburi. As head of the Chonburi Fisheries Association, he was responsible in understanding the problems of local fishers, the consequences of unsustainable fisheries practices and other natural and human-induced factors on local food security and livelihood. He considered the local people's lack of awareness and understanding of the marine resources and environment and how these were adversely affected by their activities, as well as weak law enforcement at the local level, as among the root causes of problems that affect the sustainability of local fisheries.

Based on his extensive management experience and being a fisher himself, Mr. Chatchai believed that providing a demonstration was the best strategy to capture the interest of local fishers and to educate them on environment friendly fishing practices and marine conservation. He knew how local fishers learn from each other by sharing experiences and efficient techniques.

Figure 2. Mr. Chatchai Thimkrajang demonstrating a gravid female crab being placed in an enclosed tray for nurturing until the eggs are released.



Approach and Methodology

The “crab condo” project

Scientific studies have shown that one female crab can produce up to a million eggs (depending on the size of the crab) (Nitiratsuwan, et al., 2007; Oniam, et al., 2012; Kunsook, et al., 2014). Recognizing the unrealized potential if these gravid crabs are captured and sold before they are able to release their eggs, a novel idea of “protecting the mother,” instead of the conventional approach in marine and coastal resource management of protecting the young, was adopted and tested in Chonburi as one of the conservation activities of the ICM program.

Inspired by the condominium developments in Sriracha Municipality, the design consisted of a stack of baskets so that each gravid crab was kept separately to facilitate feeding, maintenance, and removal after release of eggs (Figures 2 and 3). The local fishers called it “crab condominium” or more popularly, “crab condo”. The structure was submerged near the coast, using floating rafts, to facilitate regular feeding and maintenance. Collaborative arrangements among local fishers were made: for them to “surrender” gravid female crabs for stocking the crab-condo; for maintenance of the structure; and for sale arrangement after the release of eggs. Funding was secured from the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) to support the pilot demonstration of the project in Sriracha.

Pilot testing of the crab condo

In partnership with the Chonburi Fisheries Association, the Sriracha Municipality introduced the crab conservation project to local fishers in Sriracha Nakhon Village and enlisted their support in building the first “crab condo”

Figure 3. The “crab condo” consists of stacked trays (left) that are submerged using floating rafts (right). Local fishers are responsible for maintaining the setup.



using reusable materials to house a maximum of 120 female crabs. This pilot initiative served to test the initial “crab condo” of its durability, operational and maintenance requirements, and management by the local fishers. Technical support was provided by Kasetsart University to monitor and evaluate outcomes associated with the crab conservation project, including regular monitoring of water quality as well as plankton composition and biomass.

A year later, Sriracha Nakhon Village received a grant from the national government’s SML (Small, Medium, and Large Villages) Program. The program aimed to encourage villagers to take part in solving community problems in response to local needs.

Under the guidance of the fisheries association, local government, ICM program coordinator and technical advisers, and local universities, the villagers used the additional budget to triple the crab condo’s holding capacity from 120 to 360 female crabs and to strengthen the holding structure further by using better materials.

Extension of the crab condo demonstration to other villages

With increasing knowledge and confidence and ownership of the demonstration project, the Sriracha Nakhon villagers became speakers and educators to other interested villagers, including the neighboring village of Choom Chon Rim Talay. Among those interested in the project were seafood restaurant owners whose business depended on sustainable crab supplies. At that time, the crab condo operation in Sriracha Municipality was able to house 1,600 gravid female crabs with a potential of releasing an estimated 1.6 billion eggs. Consequently, fishers also noted higher crab harvests compared to the same periods in previous years.

Utilizing the conservation program as platform for public education and engagement

The crab condo project, with its catchy name, attracted media attention and visitors to its facility including schoolchildren, fishers, and officials from other local areas. Concurrently,

the local government and fishers in Sriracha Municipality were taking the opportunity to promote marine conservation in general including providing visitors with hands-on experience in releasing crabs and other marine species.

A partnership arrangement was also made with Duang Manee School, a private elementary and junior high school in Sriracha, to develop an outdoor learning curriculum that emphasized the relationship among the marine environment, marine resources, marine conservation, and local livelihood. The curriculum included project activities in relation to marine and coastal resources management as well as discussions and interactions with municipal officers and experts.

Facilitating technical and financial assistance to other areas interested to replicate the program

In 2007-2008, the crab condominium concept was replicated in coastal fishing villages in other local municipalities and cities in Chonburi Province. Fishers from the Rim Talay Village in Sriracha Municipality worked with fishers of Wat Luang Village of Bang Phra Municipality and Ban Laem Chabang Village of Laem Chabang Municipality to develop crab condos through project grants from the Global Environment Facility/United Nations Development Programme/Small Grants Programme (SGP) and the national government's SML program. The ICM Project Office in Sriracha assisted community-based organizations in developing the project proposals submitted to SGP. In accordance with the SGP process, the grant amount was given directly to the community-based organizations, as part of capacity building and empowerment of local communities in environment and natural resources management.

Integrating crab conservation into local development plans and leveraging support from various partners

In order to sustain crab conservation activities, local governments eventually mainstreamed it as part of their environmental plans and budgets. In addition, some municipalities were able to leverage more funding support from external sources. For example, coastal fishing villagers from the municipalities of Bang Sarae, Sattahip, Saensuk, and Banglamung applied the crab condo model in 2009 and 2011, respectively, by using funds from their local governments and private sector partners.

Variations in holding technique for gravid crabs

In areas with strong wave action, the crab condo model demonstrated by Sriracha Municipality was difficult to maintain. In Sattahip and Saensuk, the technique was modified with the construction of onshore holding structures to keep the gravid crabs until their eggs were released. In Sattahip, cement ponds were constructed and filled with seawater, which was periodically oxygenated. In Saensuk, plastic buckets containing seawater were used with continuous oxygenation using air pumps (Figure 4).

Other conservation approaches

To complement the conservation approach of protecting gravid female crabs in holding structures, the Chonburi Fisheries Association provided the fishers with crab traps of appropriate/legal mesh size, in exchange for traps with illegal mesh sizes. The new traps were designed to protect young crabs from capture until they reached the standard size for consumption. Local governments also released juvenile crabs and fish to celebrate holidays and special occasions.

Figure 4. On-shore holding structures for gravid crabs in Saensuk Municipality (left). Mr. Narongchai Khunpluem, Mayor of Saensuk Municipality, placing a crab in one of the tanks (right).



Other conservation/rehabilitation measures focusing on sea turtles, mangroves, seagrasses, coral reefs, beach areas, and environment-friendly aquaculture techniques were also implemented by local governments and used as opportunities for stakeholder education and participation.

Results

Increased crab catch

Interviews with local fishers in Bang Phra Municipality in 2010 showed that crab catch using collapsible bottom trap and gill net in Sriracha Bay increased from 1–5 crabs per night before the crab conservation program started to 5–10 crabs per night in 2010. A study conducted by the Sriracha Fishery Research Station of Kasetsart University for Saensuk Municipality using 60 collapsible bottom traps and 1.5 km-long crab gill net showed increase in crab catch per deployment from 54 crabs in 2011 to 105 crabs in 2012 (a 94% increase), accompanied by an increase in average crab carapace size from 3.88 cm to 4.51 cm ([Sriracha Fishery Research Station, 2011, 2012](#)). The

increase in crab catch also increased the income of the local fishers.

Raised public awareness, participation, commitments, and financial resources in marine conservation

Through the successful crab conservation initiatives, the local fishers and general public's understanding on the need for and benefits from marine conservation has broadened. The fishers played a significant role in securing gravid female crabs and also in the operation and maintenance of the holding structures. This has greatly enhanced their understanding, commitments, and skills with greater appreciation of teamwork and networking among fishers' groups. With technical and financial support from the local government and other partners, the fishers also learned about the importance of collaborating with the local government and of following regulations.

Crab conservation was incorporated into the local development and budget plans of eight municipalities in Chonburi as a component of marine conservation in Sriracha, Saensuk, Satthahip, Laemchabang, Bang Phra, Banglamung, Bang Sarae, and Pattaya City.

Inspired other local governments in Chonburi to adopt ICM approach

With the benefits of crab conservation initiatives and strong stakeholders' support, many local governments in Chonburi were impressed with the benefits and efficiency of the ICM concept and approach in addressing local concerns. This inspired many of them to adopt the ICM system. From 2006 to 2010, the number of local governments implementing ICM in Chonburi increased gradually from the initial 5 demonstration sites to all 26 coastal governments, and later to noncoastal ones as well, covering the entire province (Kanchanopas-Barnette, et al., 2012).

Lessons Learned

Capable and well-exposed local leadership can mobilize resources and strengthen collective efforts in addressing local economic, social, and environmental concerns.

Many of the achievements in implementing ICM demonstration, in particular, the crab conservation project in Sriracha Municipality were largely attributed to the efforts and leadership of the mayor who was convinced of the concept and sustainable development objectives of the ICM system. Study tours and participation in workshops and forums overseas enhanced his knowledge, vision, and commitment to address the social, economic, and environmental challenges of his municipality. His efforts to involve the local fishers and coastal communities strengthened the voice and participation of the stakeholder while mobilizing national and external technical and financial support.

The benefit of starting small is a guiding principle in environmental management at local level to test and demonstrate applicable measures, which are practical and relatively easy to understand, implement, and replicate.

The idea of protecting the gravid female crabs to allow them to release their eggs and improve future harvests was a practical concept that local fishers easily understood. The potential benefits that fishers gained from the crab conservation project encouraged their voluntary participation and cooperation. Thus, the project was able to use one village as a pilot site with a relatively small setup to demonstrate the methodology and test its implementability. With the initial success, replication in other villages was possible.

Engaging local stakeholders as partners and enhancing their capacity strengthens effectiveness in sustainable management of marine conservation initiatives.

Local stakeholders, including fishers' groups and communities, can play leading roles if they are given opportunities to enhance their knowledge, capacity, and skills in practical measures that address their common concerns. This was demonstrated in the case of fishers in the Sriracha crab conservation project. Willingness to share lessons and experiences with fellow fishers in other municipalities also contributed to replication and adoption of approach and techniques to meet local conditions.

Mainstreaming crab conservation was made possible when local government recognizes the dynamic role of local fishers in marine conservation.

The initial allocation of local budget by Sriracha Municipality and other local governments in subsequent initiatives made it possible to implement crab conservation activities. The success of the demonstration and replication projects

convinced local governments of the value of local fishers' participation in marine conservation activities. This led to mainstreaming crab conservation projects into local government plans, ensuring financial sustainability.

The concept and practice of ICM supports national decentralization policy to engage local governments and stakeholders.

In Thailand, the decentralization policy and governance framework promote a people-centered development aimed to increase the participation of all stakeholders. Hence, the introduction of ICM governance framework and process in Chonburi was well-received by both national and local governments as ICM provides a broad sustainable development framework and a systematic planning and implementing process in addressing environmental, social, and economic challenges.

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The Club of Coastal Community for Sustainable Development of Tho Quang Ward, Son Tra District, Da Nang City, Viet Nam

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Key Message

- Da Nang's socioeconomic development is highly dependent on its rich marine and coastal resources particularly in supporting fisheries and coastal tourism. A main challenge is to guarantee the rights of the fisherfolk while managing coastal resources to support the coastal tourism industry.
- An innovative approach implemented by the Da Nang City government was the establishment of the Club of Coastal Community for Sustainable Development, which promoted the direct participation of local communities in coastal resource management (CRM) and alternative livelihood options.
- The city's integrated coastal management (ICM) program played a key role in expanding the involvement of civil society and facilitated a unique community empowerment and co-management arrangement.

Abstract

The City Government of Da Nang, Viet Nam implemented an ICM program in 2000 to support sustainable coastal development. One of the key activities was the implementation of coastal zoning plans to resolve or reduce multiple use conflicts in Tho Quang ward, a commune in Son Tra district. Tho Quang ward was zoned for tourism development but 38% of households relied on fishing, aquaculture, and seafood processing. Destructive fishing was contributing to the serious decline of targeted marine species in Son Tra peninsula, while seafood processing was polluting and affecting the coastal landscape. Environmental and marine resource guidelines of the country's Fisheries and Aquaculture Law were not observed by locals as they perceived that management and the protection of coastal resources were the sole responsibility of government agencies. The city government responded by establishing the innovative Club of Coastal Community

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for Sustainable Development to strengthen the capacity of local communities and encourage their involvement in ICM program activities including biodiversity conservation and protection and habitat rehabilitation. At the same time, it served as a forum for developing and promoting alternative livelihood options to generate higher incomes and better living conditions among members. The ICM program built up experience in community engagement and participation and facilitated an increase in awareness, capacity, and ownership among local communities. This case study documents the development of the club, the implementation process, and some initial results.

Background

Da Nang's coast is rich in natural resources that are very valuable for the city's socioeconomic development. Protecting and managing the marine and coastal resources was a big concern. The limited management capability and weak involvement of coastal communities in efforts to protect the environment was resulting in excessive exploitation of these resources.

In response, Da Nang City issued guidelines that strengthened local capability for resource management, protection of rare and endangered aquatic species, and recovery and management control of coastal ecosystems and habitats. The city government promoted the Club of Coastal Community for Sustainable Development, a model that devolved management responsibility to local communities in accordance with their customs.

Primarily, the club's purpose was to provide a solution that guaranteed the rights of fishers via a co-management approach. It improved the livelihoods of people, especially those heavily dependent on coastal resources. In addition to newly created jobs, club members were assured of sustainable utilization of the coastal fishery resources.

Such a model of shared powers, responsibilities, and benefits for the protection and rational use of coastal resources was developed and implemented in the community of Tho Quang ward under the ICM framework.

Location

Tho Quang ward, located in Son Tra peninsula (Figure 1) has a population of around 20,000 people living within an area of 46 km². Its coastline stretches 18 km, covering the entire Tien Sa harbor. An estimated 38% or an equivalent 2,136 households was reliant on or involved in Tho Quang's major industries including fishing, aquaculture, and seafood processing. Other households were involved in traditional handicrafts, including fishnet and dragnet production. These activities were contributing to the serious decline of targeted marine species in the Son Tra peninsula (Box 1).

Processing of seafood in Tho Quang ward was causing pollution and adversely affecting the coastal landscape. Locals did not strictly observe the environmental and marine resource guidelines as provided in the country's Fisheries and Aquaculture Law. Likewise, relevant local authorities appeared to be unconcerned with managing the area's aquatic resources. The perception was that management and protection of coastal resources were the sole responsibility of government agencies. However, these agencies were lacking in both work force and capacity to supervise the use of aquatic resources effectively and to prohibit illegal practices of some fishers.

Many fishers of Da Nang City were exploiting the coastal aquatic resources using illegal fishing methods and gears. They were deploying more than 1,000 small vessels with capacities under 33 CV (*cheval vapeur*, almost equivalent to horsepower) and 680 bamboo boats. This resulted in the continuing degradation of inshore aquatic resources. According to Mr. Do Long, Head of

Figure 1. Location map of Tho Quang ward.

Da Nang map and Tho Quang map: Imagery (C) 2018 CNES / Airbus, DigitalGlobe, Landsat / Copernicus, Map data (C) 2018 Google

Box 1. Marine biodiversity in Hon Chao and Son Tra peninsula (Nguyen and Hoan, 2006).

A marine biodiversity study of the Hon Chao (south of Hai Van) and Son Tra peninsula by the Institute of Oceanography in Nha Trang listed 191 hard coral species belonging to 47 genera, 3 soft coral genera, 3 seagrass species, 72 seaweed species, 53 mollusc species, 23 echinoderm species, and 221 phytoplankton species. Covering an area of 104 ha, the survey showed that only 10% of coral reefs are in good to very good condition, with the remaining 90% in poor to very poor condition. Degradation of most of the coral reefs in this area is due to sedimentation and protracted human extraction.

Propaganda and Training Section of the Da Nang Farmers' Association, "State authorities have difficulty handling this problem due to the livelihood issue of the fishers. The local government appealed to fishers for their self-discipline, rather than imposing more supervision by State authorities."

Approach and Methodology

The development and implementation of the Club of Coastal Community for Sustainable Development by the government, involved the direct participation of coastal communities. The club's aim was to facilitate the implementation of relevant policies and legislations beneficial to the fishers in Tho Quang Ward. It was also targeted to help in public information and education campaigns aimed at reducing adverse impacts on the coastal environment, and in assuring effective and rational use of coastal resources.

The ICM program, in collaboration with the Da Nang Farmers' Association, helped the Tho Quang coastal communities and fishers to expand their perspectives with regard to use and management of the coastal resources and the environment. The partnership executed various plans and actions on alternative livelihoods in sustainable industries for the fishers, affording them higher income and better living conditions.

ICM – a framework for sustainable development of Da Nang City

The implementation of ICM in 2000 was designed to support the city government's sustainable development targets as manifested in the city's Coastal Strategy and Implementation Plan (CSIP). The Da Nang ICM program focused on creating a policy environment and financial mechanism for the protection of coastal, environmental, and ecological values as well as building stakeholder capacity.

The ICM program provided problem-solving tools on environmental pollution, coastal resource degradation, natural disasters, and addressed livelihood issues and food safety concerns (PC Da Nang City, 2001; PC Da Nang City and PEMSEA, 2004). In particular, the coastal use zoning plan was instrumental in helping the government to solve use conflicts and conserve biodiversity including coral reefs around the Son Tra peninsula (PC Da Nang, 2005).

Features of the club

The club was launched on 2 November 2010 with leaders and representatives from the Da Nang Farmers' Association, Da Nang Department of Natural Resources and Environment, Da Nang ICM Program, Da Nang Environmental Protection Agency, Division of Natural Resources and Environment of Son Tra district, Economic Division of Son Tra district, Farmers' Association of Son Tra district, People's Committee, Fatherland Front and Farmers' Association of Tho Quang ward.

The club held its first meeting on 4 December 2010, to approve its membership and chairmanship. Subsequent regular quarterly meetings were held thereafter. Membership increased from 20 to 37. The club was primarily a volunteer organization of workers in fishing, aquaculture, and seafood processing. Its policy was to protect the environment at the community level and assist in the enforcement of the Fisheries and Aquaculture Law and other guidelines related to fishing, aquaculture, and sea product processing (Box 2).

The club, in cooperation with the Farmers' Association, spearheaded information and education campaigns that mobilized coastal residents to implement policies and laws on fisheries and coastal resources as well as to participate in protecting the environment in Tho Quang ward and nearby areas (Box 3).

Results

Due to the club's efforts, several coastal communities became committed to: (a) participate in coastal resources and environmental protection; (b) practice sustainable use of coastal and marine resources; (c) implement community-based waste segregation and wastewater treatment; and (d) participate in environment and ocean-related events. The following are some of the major outcomes of the club initiatives:

- 1. Increased awareness on environmental protection.** About 300 attendees from Son Tra and Ngu Hanh Son districts participated in three information and education campaign training events on ICM. The attendees also enhanced their disaster preparedness skills during the exercises. Seventeen beach cleanup campaigns were conducted and attended by all 300 of the club's members. Flyers about the fisher's role in the development of the Environmental City were disseminated. The club also launched the Green-Clean-Beautiful Sundays to advocate environmental cleanup. This also had spinoff benefits for the club itself. In 2012, 22 members from Tho Quang and other nearby wards joined the club (15 from Nai Hien Dong Ward, 4 from Man Thai, 1 from Tho Quang, and 2 from Thuan Phuoc Ward).
- 2. Improved protection of coastal and marine resources and management of water pollution.** The club was responsible for both harvesting coastal resources using allowed methods/tools and protecting coral reefs and seaweed in Son Tra. Since the club's formation, better monitoring and enforcement plus more fisher-volunteers led to the apprehension of offenders in eight cases of illegal coral exploitation and two cases of seaweed collection within the restricted zone in Son Tra peninsula. People in the community completely discontinued illegal coral extraction

Box 2. Objectives and activities of the Club of Coastal Community for Sustainable Development.

The club's purpose was to enhance the responsibility of coastal communities in the protection of coastal resources and environment, and strengthen coordination among management authorities and the communities. Club members were typically local fishers who volunteered to protect the corals. Members could potentially increase their income from fishing due to better working conditions and assistance from authorities.

Members were duty-bound to prevent and promptly report violations, such as dynamite fishing and collection of corals in protected areas to authorities. They were also responsible for disseminating information on marine and coastal resources protection to other fishers in nearby communities.

The club's activities were to:

- develop a five-year (2010–2015) coastal development plan for the community;
- coordinate training to raise public awareness on coastal resources and environment protection, laws and regulations, cultural behavior, and disaster risk reduction and prevention skills. Participants in the training could include club members and representatives of fishing, aquaculture, and seafood processing households;
- participate in environmental response exercises organized by the government;
- conduct information and education campaigns on coastal resources and environment protection for the Action Day-Week-Month for Environment, Clean up the World Day and other occasions;
- mobilize coastal communities to participate in beach cleanup activities such as during Green-Clean-Beautiful Sunday, National Week of Clean Water and Sanitation, World Environment Day, Vietnam's Sea and Islands Week, and Clean Up the World Day;
- guide, advise, and conduct vocational consultations and technical assistance for people to secure loans in shifting to other jobs; and
- recognize individuals who exhibited excellence in the coastal green-clean-beautiful environmental protection, and publicize their example for others to emulate.

Box 3. The Articles of the Club's Convention on Coastal Resources and Environment Protection.

The main articles of the Club's Convention on Coastal Resources and Environment Protection were:

1. Comply with the regulations in managed fishing areas, ensure security and order in each area.
2. Respond to coastal environmental incidents and rescue people and ships in distress.
3. Detect, denounce, and deter destructive practices such as fishing with explosives, toxic chemicals, electric shock, fine mesh nets; collecting coral without permits; hunting birds and wild beasts; cutting forest trees; and damaging the ecosystem in the Son Tra peninsula.
4. Supervise and mobilize the households engaged in aquatic products processing and services business in Tho Quang Ward to stop discharge of untreated waste and wastewater into the environment, and drying of seafood along coastal roadsides.
5. Mobilize people to join the beach cleanup activities in support of the Green-Clean-Beautiful Sundays and Action Day-Week-Month for the environment.
6. Encourage members to be pioneers and to assist each other in shifting to other jobs to support coastal sustainable development.

and significantly reduced the use of small dragnets for inshore fishing. Club members were active in information and education campaigns, raising the awareness of other fishers in neighboring areas on the rules of marine resource exploitation and reef protection. Local authorities were able to better regulate aquaculture activities that were polluting marine resources.

3. **Improved coastal environment.** The club mobilized 500–600 people to regularly clean public areas as well as their residences along the beaches. Communities reintroduced some coastal flora and fauna, which improved the Tho Quang ward landscape. The club also promoted environmental sanitation such as solid waste collection along 5 km of beach area by the Hoang Sa coastal road (from Loc Hoang to Thanh Vinh). It recommended to the city government the provision of appropriate space for drying seafood products. Some 25 households received adequate drying space that did not affect available recreational areas. Club members enjoyed a more conducive environment that enhanced their quality of life.
4. **Increased participation of communities and organizations in marine and coastal resources and environmental protection.** A total of 2,136 aquaculture and fishing households in Tho Quang ward benefited from information campaigns. As a result, 1,800 households committed to protect coastal resources and the environment, with no aquaculture, no coastal fishing, no seafood drying by coastal roads, and collaborate with City government to manage solid waste and carry out treatment of sewage before discharging into the environment.
5. **Job creation for local fishers through skills training and livelihood assistance.** A total of 200 participants from 42 fisher households were engaged in vocational training. As a result, 40 fishing households switched to fish

farming, mushroom and flower cultivation, and other services such as offshore fishing boat servicing. Five households formerly engaged in aquaculture shifted to tourism services, acquiring two canoes and an upgraded vessel (35 horse power capacity). The new vocations provided the fishers with more stable sources of income and better working conditions.

Club members also received assistance such as guidance in availing of loans, experience sharing, and technical and vocational consultations. Six households received loans from the Farmers' Association of Tho Quang ward to assist them during shifting from aquaculture to other jobs. Moreover, club members and fisher households were able to invest VND 530 million (US\$ 25,000) to upgrade three small boats to larger vessels for tourism services. Various initiatives created 14 permanent jobs, 5 of which went to members of the club. Finally, it was able to convince 20 households doing fish and snail farming in the storm-sheltering area of Tho Quang Ward to obey the regulations prohibiting farming in the area.

Lessons Learned

The Club of Coastal Community for Sustainable Development was an innovative approach in Da Nang for organizing and engaging local communities as stakeholders in environmental protection and sustainable use of natural resources under the ICM program. It facilitated interaction between club members and government representatives, and gave a voice to the communities who were otherwise sidelined but affected by government planning and development programs.

With active involvement early on, the communities were able to take ownership of the club and to convey the rationale and benefits of improved

CRM to authorities. The government became more aware of the priorities, capacities, and needs of the community. The government supported the community with skills development, financial aid, technical advice, and alternative livelihood, hence enabling the community to experience the benefits of responsible management.

With the active collaborative effort of the people and organizations, the adverse impacts of past activities that resulted in pollution and depletion of marine resources were reduced and even eliminated.

Reducing the dependence of communities on coastal and marine resources, and enticing them to switch jobs or to look for alternative livelihoods, naturally lessened the pressure on the environment. It likewise enabled the recovery of some key marine species such as coral, algae, and seaweed. More importantly, it generally provided higher income with better working conditions, leading to a much-improved quality of life.

Despite considerable achievements, efforts are still needed to resolve some challenges, including: (a) limited financial assistance to fishers who switched jobs; (b) insufficient knowledge and competency of club members continue to influence performance,

despite undergoing training; and (c) lack of sustained support from relevant sectors and authorities. These challenges will be overcome through sustained ICM practices.

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Beach Management in Sihanoukville, Preah Sihanouk, Cambodia for Sustainable Tourism

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Key Message

- It is necessary to manage the development of a beach so that sound environmental and aesthetic quality is retained.
- Zoning is necessary to accommodate increasing and varied facilities and visitors as it rationalizes best use of the beach with minimal environmental degradation, use conflicts, and visitor dissatisfaction.
- The participation of stakeholders in the planning and execution of the zoning plan remains crucial to their acceptance and support.
- The integrated coastal management (ICM) program facilitated consultations among the government, private sector, and service providers in a collaborative endeavor to encourage sustainable tourism.

Abstract

The beaches of Sihanoukville were attracting increasing numbers of local and international tourists. Despite the economic benefits of coastal tourism, serious social and environmental problems were arising as investments to improve or even maintain the beach environment and its facilities were inadequate. The lack of regulatory guidelines resulted in haphazard proliferation of tourist facilities, activities, and waste disposal that compromised environmental quality, increased user conflicts, and threatened the beach's attraction to tourists.

The provincial government initiated the ICM program in 2001 to sustainably manage coastal and marine resources. The primary tool used to attain the Coastal Strategy objectives was coastal use zoning, which was established throughout the province in 2004 and adopted by the National Coastal Steering Committee in 2005. With the burgeoning tourism industry, a special

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focus on zoning for tourism was adopted, cutting across the three priorities identified in the Coastal Strategy Implementation Plan: pollution, livelihood management, and habitat protection. Ochheuteal Beach was selected as a pilot site for the Tourism Development and Management Project under the ICM program to address the worsening problem of beach encroachment by tourism facilities and to demonstrate good practices in beach management through a partnership between local government and private sector. This case study focuses on the benefits, outcomes, and challenges of Ochheuteal Beach management for sustainable tourism.

Background

Sihanoukville, the capital of Preah (Province) Sihanouk has seven major beaches and islands. The white sand and clear shallow waters are a major draw for tourists and provide a steady source of income for the province. Tourist accommodations and establishments expanded quickly to cope with the steady upswing of visitors, from 19 hotels and guesthouses in 1993 to 57 hotels and 221 guesthouses in 2014. Between 1993 and 2003, domestic visitors to Sihanoukville increased from 4,585 to 83,888 and foreign tourists, from 8,428 to 33,604 (Libosada, 2004). By 2014, there were over a million domestic and foreign visitors. Today, Ochheuteal Beach is one of the most popular tourist beaches due to its accessibility.

An exponential increase of visitors is expected with the establishment of regular flights to and from the province. The increasing activities are intertwined with the fast population growth. The province's GDP per capita was US\$ 1,095 in 2014 (World Bank, 2015) while the annual population growth rate of 2% was the highest among Cambodia's coastal provinces. Despite the economic benefits of coastal tourism in the province, serious social and environmental problems were arising compounded by limited investments to improve or even maintain the beach environment and its facilities.

Preah Sihanouk initiated the ICM program in 2001 to sustainably manage its coastal and marine resources amid rising urbanization. Three major areas of concern were identified in the province's Coastal Strategy Implementation Plan (CSIP): pollution reduction and waste management; food security and livelihood management; and habitat protection and management.

From 2004 to 2008, various pilot projects were implemented under the ICM program. Coastal use zoning was the primary tool used to facilitate the Coastal Strategy objectives. In 2004, coastal use zoning was established throughout the province and adopted by the National Coastal Steering Committee in May 2005. With the burgeoning tourism industry, zoning activities were completed with a special focus on tourism. Against this backdrop, Ochheuteal Beach was used as a pilot site for the Tourism Development and Management Project in 2004.

Approach and Methodology

The pilot project in Ochheuteal Beach was focused on the worsening problem of beach encroachment by tourism facilities and the establishment of good beach management practices through a partnership between local government and private sector. The development plan was initiated with a series of workshops and studies on tourism dynamics and a tourist profile (Libosada, 2004). The results were used as the basis for management recommendations.

Beach environment

At the time of the study in 2004, Ochheuteal Beach was divided into three areas: the beachfront, terrestrial, and private development, which was separated from the beach proper by a road (Visal and Nay, 2012). Both beachfront and terrestrial areas were owned by the government, while the private development area was a mix of privately

owned and operated hotels and guesthouses. Growth in the number of accommodations in Ochheuteal Beach increased steadily since 2004 (Table 1).

Nonpermanent structures, such as huts and stalls, in beachfront and terrestrial areas were developed into “semi-permanent” structures, with concrete flooring and solid foundation. In 2004, there were 36 stalls in both areas. Revenue was generated from renting out tables, chairs, and beach gear, such as floaters, as well as preparing/selling food and drinks. The zoning plan was focused on beachfront and terrestrial areas as these were public land and the location of most of the informal infrastructure.

Table 1. Accommodations in Ochheuteal Beach.

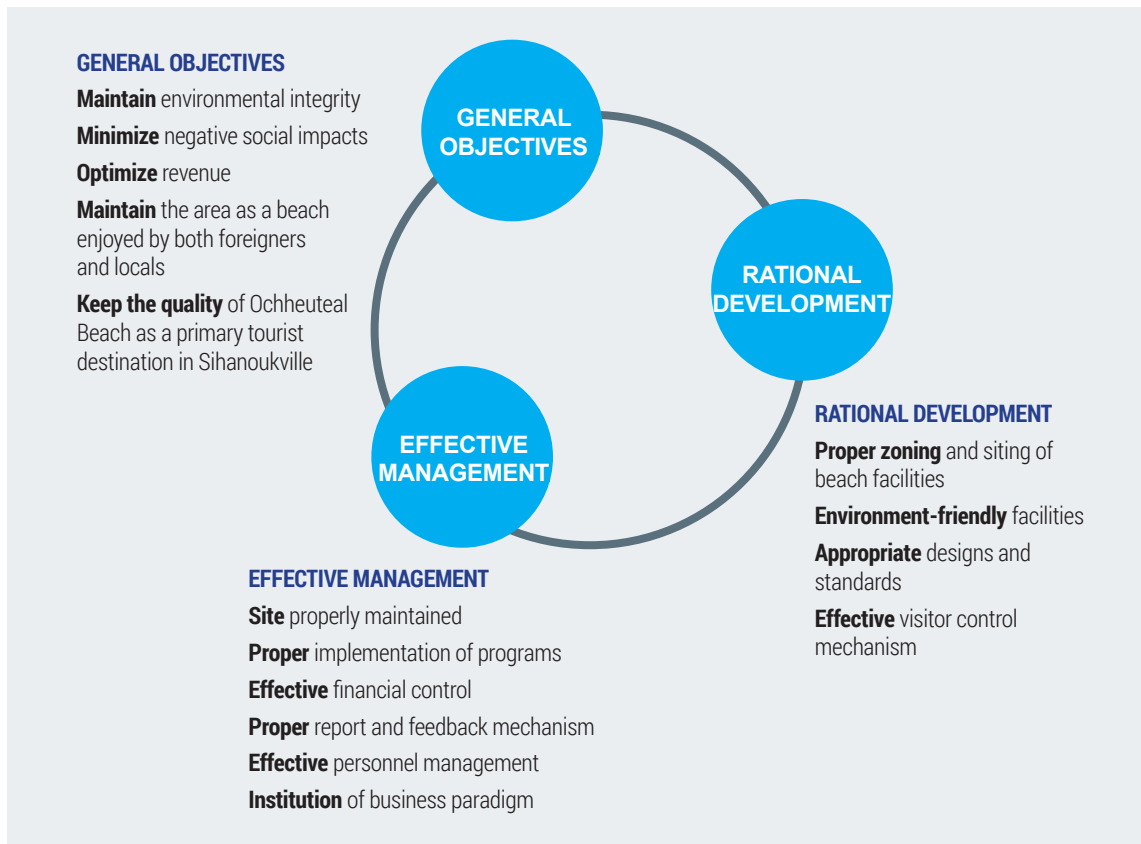
Accommodation	Number of Units				Occupancy Rate (%)		
	2004	2012	2013	2014	Lean Season	Peak Season	Holidays
Hotel	6	12	16	20	40	60	90 - 100
Guesthouse	23	24	38	46	40	75 - 80	100

There was very little effort to maintain the quality of Ochheuteal Beach, in terms of environmental protection and sustainable tourism. The huts/stalls were not well placed or spaced. Most of them were situated in the beach area while the terrestrial area served primarily as a parking lot, temporary garbage dump, and improvised toilet facilities (Figure 1).

Figure 1. Environmental degradation of Ochheuteal Beach at the start of the project in 2004 (Visal and Nay, 2012).



Figure 2. Management framework for Ochheuteal Beach (Visal and Nay, 2012).



Studies and site visits confirmed that the lack of sanitation and unacceptable wastewater disposal were causing unsightly and unhealthy conditions. Some toilets were situated very near to creeks that emptied to the beach area. Wastewater pipes were located directly in the beach area, significantly affecting beach aesthetics. A number of establishments were lacking proper wastewater disposal facilities, with wastewater discharging directly to ground surface.

Tourist profile

The tourist profile was observed as follows (Visal and Nay, 2012):

- Most tourists were backpackers. Tourist operators were generating only a limited income from backpackers resulting in limited investments for improving facilities and services.
- Tourists were primarily visiting Sihanoukville as a gateway to either Thailand or Viet Nam, and not as their main destination. This limited the duration of their stay and spending. Visitors were staying for a maximum of two days, or for the duration of public holidays.
- The illegal construction of stalls and huts were making Ochheuteal Beach and other beaches unsightly. Further, the poor condition of such

facilities was turning tourists away as well as creating access problems.

Tourism plan

A comprehensive Tourism Development and Management Plan was designed for Ochheuteal Beach (Figure 2) to address environmental concerns, promote it as a primary tourist destination, and increase visitorship.

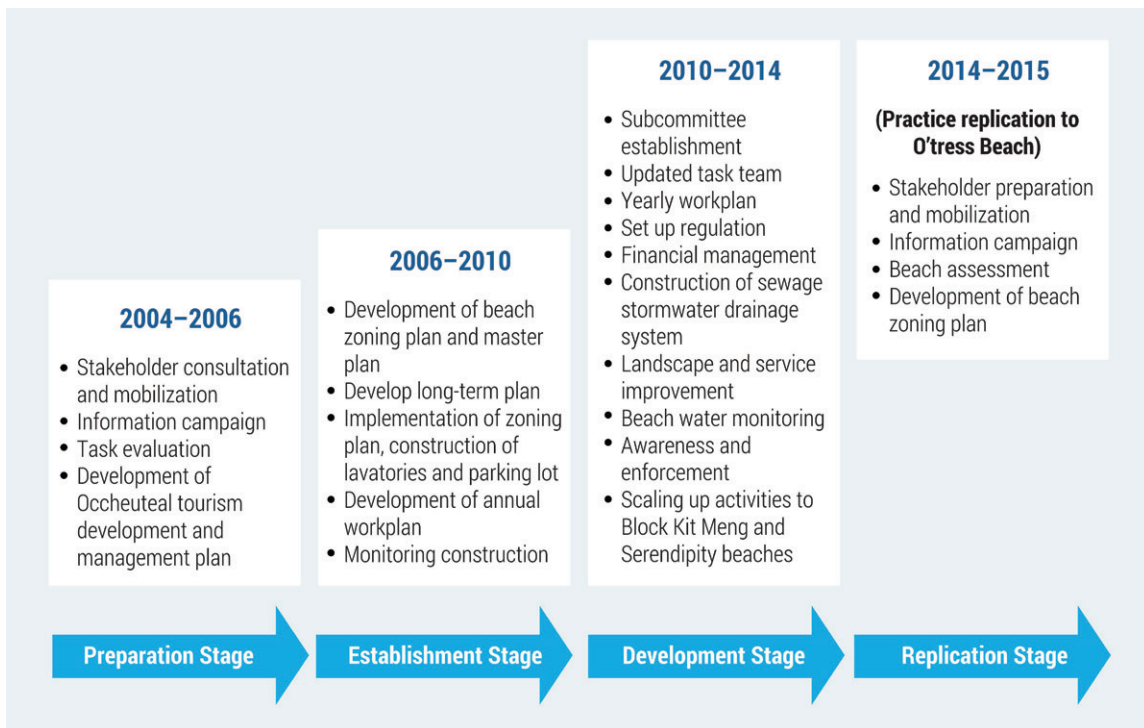
In the tourism plan, zoning was the foundation for beach management. It provided a rational approach to the management of the beach by (a) ensuring the correct placement of infrastructure and facilities; (b) maintaining the beach’s integrity; and (c) creating legal impetus for improved tourist facilities and services (Visal and Nay, 2012). It was foreseen that terrain in Ochheuteal Beach would become increasingly vulnerable with the rise in

tourism. Thus, zoning was ultimately a pre-emptive step in preparing for larger numbers of visitors. This was reflected in the plan by the definition of the easement zone, i.e., the distance of permanent structures away from the beach.

Preparation and implementation of the pilot project was undertaken by a Task Team headed by the Department of Tourism, under the ICM Project Coordinating Committee (PCC) and supported by a local deka (provincial ordinance) issuance. PEMSEA provided technical assistance and financial support throughout the project. Figure 3 summarizes the various activities that were conducted for Ochheuteal Beach management over an eight year period.

The pilot area for beach zoning was completed covering 704 m length of Ochheuteal Beach. Consultations were conducted at the start of the

Figure 3. Ochheuteal Beach development stage, scaling up, and replication.



project to identify the zones in the beach area, as well as the permitted and prohibited activities within each of the zones. The Ochheuteal task team engaged stallholders and private investors in the process of planning and development, particularly in identifying activities allowed in each zone. Getting the various sectors involved in all aspects of consultations resulted in more positive buy-in on the execution of the zoning plan and in getting local investments. The zoning plan was composed of five major zones (Figure 4 and Box 1). Despite the consultations, implementation was met with the following challenges:

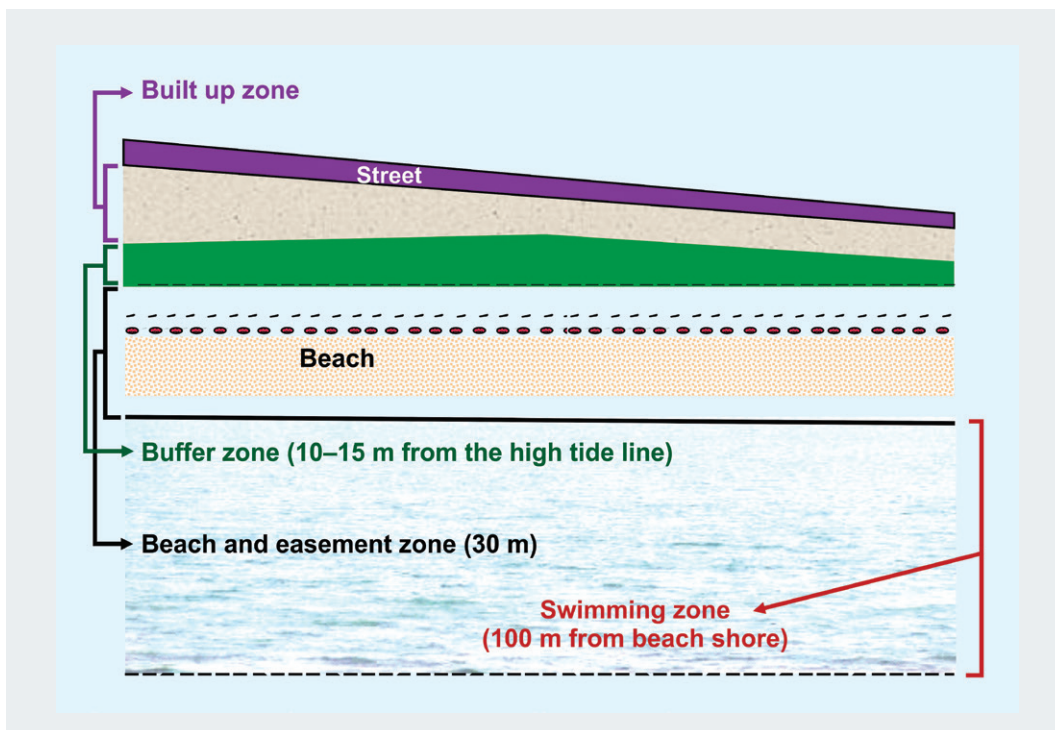
1. The new rules on beach zoning were met with various criticisms from stall owners. This was primarily due to lack of any prior rules and regulations, aside from the

payment of a tariff for use of public land (beach area). Furthermore, stall owners were apprehensive that the enforcement of the zoning scheme would be uneven and selective.

2. Stall owners were required to remove semi-permanent structures and invest in new improved ones which were costly and without any guarantee of return.
3. During the construction period, there was a temporary loss of livelihood.

In 2008, zoning was implemented coupled with the construction of lavatories and parking spaces by the local government. This was a concrete means to demonstrate the government's commitment to improve beach management.

Figure 4. Beach zoning for Ochheuteal Beach, pilot phase (Visal and Nay, 2012).



Box 1. Marine functional zoning.

Beach zone

The beach area was a no-build zone for permanent facilities. Only beach appliances such as chairs and umbrellas were allowed. This zoning condition provided an increased area for beach activities and reduces potential impacts of soil erosion by dispersing the intensity of human activity (Photo 2).

BEFORE ZONING



Photo 1. Tourist facilities are too near the shore, causing erosion as well as solid and liquid waste pollution.

AFTER ZONING



Photo 2. A significant portion of the beach has been cleared of structures. This photo shows the beach area (green arrow), easement (20–30 m, blue portion), and a part of the buffer zone (10–15 m, brown arrow). Only umbrellas and chairs are allowed in the beach area.

Swimming zone

Prior to the implementation of zoning, no specific areas were devoted to swimming. Jet skis, boats, and other water craft were allowed to operate and park anywhere. Photos 3-5 illustrate the conditions prior to zoning. Photos 6-8 show after zoning conditions; the swimming zone was delineated as the waters extending 100 m seaward from the mean high tide; and the area was kept free from mechanized water craft to avoid accidents and conflicts over sea use.

BEFORE ZONING



Photos 3–5. Failure to restrict water vehicle parking shows tourist boats occupying even the swimming area.

AFTER ZONING



Photos 6–7. A pier was established for vessel anchorage and as an embarkation point.

Photo 8. Buoys and markers were used to identify the swimming zone's boundaries.

Easement zone

Photo 9 shows the disorderly condition prior to zoning enforcement, when most establishments were located in the easement area. **Photo 10** shows the improvement thereafter. An easement zone was identified to protect the beach area from unwanted sand erosion. Due to the uneven profile of the Ochheuteal Beach area, two easement zones were implemented: 20–30 m from the mean high tide mark and 20–30 m inland. The existing beach vegetation, which is part of the easement zone was protected to prevent sand erosion. The relatively narrow easement zones were recommended to accommodate the limited builtup zone bordering the beach. Finally the easements served as additional buffer against destructive typhoons.

BEFORE ZONING



Photo 9. Concrete posts within the easement and buffer zones were established on public land in the beach.

AFTER ZONING



Photo 10. The easement zone ranged 20–30 m from the mean high tide mark. No permanent structures were allowed in this zone.

Buffer zone

A buffer zone of 10 m from the easement zone was established (**Photo 11**). This enabled existing beach vegetation to thrive and to reduce potential impacts from development occurring in builtup zone. Most human movements, from builtup zone to easement and beach zones, occurred in buffer zone.

A walkway (**Photo 12**) was established between buffer and builtup zones to facilitate access and to serve as landmark for beach area, buffer zone, and transition between buffer zone and builtup area. The walkway also served as beach area boundary, beyond which no permanent structures were allowed. This also facilitated tourist mobility along the beach.



Photos 11–12. The buffer zone was the 10–15 m transition between easement and builtup zone. The walkway was part of the buffer zone. The trees lined up in this area were maintained to prevent erosion.

Box 1. Cont.

Builtup zone

The open space or terrestrial area immediately beyond the buffer zone at the beach's back end was integrated with the builtup zone. Most tourism development occurred here. Aside from beach-related facilities, utilization of the zone was diversified to achieve dispersal of visitors thereby decreasing density of people and providing more activities.

The builtup zone was composed of two sub-areas: immediately after the buffer zone, which was composed of semi-permanent huts and other permanent facilities beyond the huts.

The semi-permanent huts (Photos 11–12) were designed to prevent infrastructure loss and damage from erosion and other hazards. The rational and efficient use of the area improved the entire beach. To manage activities optimally and improve tourist facilities, the following investments were provided through the collaboration of the provincial government and the private sector (comprising family owners of huts and restaurants and local investors):

- automatic wastewater facility with a capacity of 94.5 m³ serving 39 establishments along the beach; this was completed and operational in 2011, reducing the discharge of wastewater to the sea; it was maintained by the provincial government through the Department of Public Works and Transport
- 74 stalls composed of semi-permanent huts and restaurants
- tourism information center
- parking space
- 8 public lavatories
- 3 souvenir shops
- 979 m of walkway
- stormwater drainage system
- wastewater collection system and storage
- beach signage
- children's playground
- 74 kitchens and 91 kiosks

To maintain these services, local operators were selected to manage and maintain each service's daily business operations and share profits with the government for Ochheuteal Beach development and management. The government also generated a revenue share in the income of public lavatories, parking lots, and souvenir shops.



Photos 13–15 (from left to right): Souvenir shop, lavatory, and parking space beside the main road were established as part of the builtup zone located beyond the semi-permanent huts.

Box 1. Cont.

The multi-agency Ochheuteal Beach Task Team, headed by the vice mayor of Sihanoukville Municipality, worked regularly on enforcement, management, auditing, and development issues in relation to the public-private services collaboration.



Photos 16–18. In 2011, an automatic wastewater facility was set up with a capacity of 94.5 m³ serving 39 establishments along the beach.



Photo 19. Infrastructure immediately after the buffer zone included 74 stalls composed of semi-permanent huts and restaurants.



Photo 20. The tourism center was located at the back end of the zone.

Project expenditures

Public funds were used primarily to establish the foregoing facilities. PEMSEA funding was used in initiating the plan and providing the wastewater facility, using a revolving fund mechanism. The total GEF/PEMSEA contribution was 4.6% of the project cost. It served as a catalytic fund, while the government provided 27% of the total infrastructure development. The bulk of the fund was

contributed by stall owners, which was about 69% of the total development fund. Details of contributions are provided in [Table 2](#).

Overall management of the project was the responsibility of the Ochheuteal Beach Task Team and the Department of Tourism, in cooperation with the stall owners and private investors.

Table 2. Partners' contribution on beach management in Ochheuteal beach.

Description	Partners' contribution (US\$)		
	Government fund	Private sector contribution	PEMSEA Support
Preparation, mobilization, and master plan			21,000
Infrastructure improvement	235,147	613,453	20,000
Parking lot	15,000		
Lavatories	75,000		
Souvenir shops (2)	24,000		
Walkway on the beach		21,453	
Rainwater drainage system	15,000		
Wastewater pipe, storage, and maintenance	10,000		20,000
Landscape improvement and other signage	10,000		
Children's playground		10,000	
Kiosk, stalls, and kitchens along the beach		492,000	
Subtotal	384,147	1,136,906	61,000
Total investment made to date		1,582,053	

Results

Increased tourism. There was an increasing number of tourist arrivals in the province from 144,995 in 2004 to 1,327,748 in 2014. An initial study indicated that tourists to Sihanoukville visited the beach at least once during their stay. This is well within the carrying capacity set by the World Tourism Council¹. Additionally, the development of nearby Serendipity Beach has helped to further disperse tourist density to more sustainable levels.

Despite the increased number of tourists, water quality was maintained at acceptable levels as shown by monitoring tests conducted for Ochheuteal Beach in 2005 – 2012².

Increased length of stay. Length of stay in the beach increased from two days (Saturday and Sunday) to an average of four days (Thursday to Sunday). This resulted in increased daily income of US\$ 80-100 among stall owners, who on average invested US\$ 20,000 in building their kitchens and huts and expected a return-on-investment within four to five years.

The appreciation for beach management and its benefits has instilled a sense of responsibility among stall owners. A recent survey revealed that stall owners were receptive to contributing to beach management with the majority willing to provide a US\$ 25-30 monthly payment.

¹ Based on 30 m² per person or 1,407 daily visitors of the 704-m beach. Due to expansion of zoning in nearby Serendipity Beach, the visitors have been dispersed in Ochheuteal Beach.

² Based on the Reports of the Sihanoukville Environmental Laboratory using ASEAN criteria for bathing waters. Parameters monitored include pH, temperature, salinity, TSS, DO, and BOD (PG-Preah Sihanouk and PEMSEA, n.d.)

Increased job opportunities. In 2004, each stall employed only three workers. In a 2012 survey, this increased to five. Similarly, in 2012, the majority of stall owners reported an annual income of US\$25,000-30,000. Previous earnings prior to project implementation in 2004 showed that stall owners earned less than US\$10,000 to US\$15,000 per year. In a 2014 survey conducted by the Taxation Office, annual income rose to US\$ 30,000 - \$40,000.

Positive demonstration. Encouraged by the progress made through beach management, other nearby stall owners adopted the Ochheuteal Beach model for management. As a cooperative effort in beach management, 35 stalls voluntarily moved to Serendipity Beach to replicate the Ochheuteal Beach model. The government, in a similar recognition of the benefits of beach management, improved road access to O'tress Beach to accommodate increased tourism. Also, after stakeholder consultations, a 1-km long buffer zone designed as a beach garden, was established in O'tress Beach. Similarly, an access road was constructed from the domestic airport to the city in order to enhance traffic security and spread the number of tourists to other destinations.

Strengthened government and private sector participation. The development of the builtup zone brought together the local government and the local business people, forging stronger cooperation and collaboration.

Greater political commitment to beach management. Having demonstrated the management of beaches, the provincial government applied for membership in the Les Plus Belles Baies Du Monde (Club of the Most Beautiful Bays in the World), based in Paris, France. The initial application was only for Preah Sihanouk, but the government amended its application to include the Cambodian Bay covering all four provinces. Its membership was approved on 25 May 2011, strengthening

the national government's resolve to consciously consider the coastal and marine resources in the country's development planning. Prior to project implementation, the national government only collected revenue through the value-added taxes and issuance of business permits. By 2014, the Taxation Office started collecting taxes on business profit. Further, part of the income from daily operations was apportioned to environmental management, security, and safety, as well as contributing to the provincial budget. The annual average collection from taxes and user fees at Occheuteal Beach was close to US\$50,000 (Table 3).

Scaling up. Learning from the beach management in Occheuteal, the project scaled up from the demonstration site to two adjacent sites: Block Kit Meng and Serendipity Beach (Figure 5). Block Kit Meng extends from the right side of Ochheuteal Beach to about 250 m. Serendipity Beach, covering 180 m, stretches to Puoy Tamong Cove.

Beach management was also extended to cover the 3,150 m O'tress Beach, the second most popular beach among the seven in Preah Sihanouk Province. Similar to the conditions in Ochheuteal Beach prior to management efforts, O'tress Beach was confronted by unsustainable tourism development activities arising from the rapidly increasing number of tourist establishments. The

Table 3. Benefits from investment in Ochheuteal Beach, by local government and daily operation (yearly).

Income derived from the establishment	Amount (US\$)
5 public lavatories and parking lot	1,500
65 stalls business permits	975
65 stalls VAT	7,800
65 stalls business income tax	19,500
Cintri waste collection company	8,000
Wastewater management facility	9,600
Grand total	47,375

Figure 5. The scaling up site.

majority of the more than 40 accommodations and 60 restaurants did not install environmental protection facilities. Based on the pronouncement of the Prime Minister on 11 July 2011, and upon advice by the Ministry of Land Management, Urban Planning and Construction, O'tress Beach became the next priority for development. The O'tress Beach Master Plan was developed on the basis of Circular 01 on the Coastal Area Development and the recommendation from the 2012 Beach Erosion Assessment Report of Ochheuteal and O'tress Beach. Preparation, consultation and mobilization; management framework; and monitoring system were based on the experiences of Ochheuteal Beach management.

Lessons Learned

Data can enable more effective management. In 2004, there was not enough data on the erosion rate and scientific bases for zoning the beach. One of the proxy indicators utilized was the observed rate of erosion in the adjacent O'tress Beach, where a

maximum of 1 m of beach was being lost per year in some areas. This was used as a benchmark and basis for convincing the stall owners to move their establishments farther away from the shore.

The zoning scheme and implementation plan were also based on the premise that moving permanent structures away from the beach would be beneficial, not only for the beach but also for infrastructure investments. The main consideration was beach protection hence, the baseline for zoning was inland from the beach.

Zoning can be both a technical and political exercise. Zoning requires a strong understanding of both the environmental aspects and the sociocultural setting. Zoning and development of less than a kilometer of beach was challenged by several issues, particularly existing illegal structures in the easement zone. Dialogues were conducted over a four-year period before the zoning could be fully implemented and enforced. Part of the agreement between the government and stall owners was a three-year grace period in the

payment of land rental to the government to allow the recovery of their initial investments.

Good results can improve recognition and acceptance. As with most environmental sustainability projects, understanding and appreciation of the importance of environmental management comes after people see positive economic benefits from the project. Compared to the initial negative perception, the recent survey indicated full agreement and appreciation among stall owners for the beach management initiatives.

Public-private partnership can be critical to success. Obtaining the buy-in from stall owners through the collaborative efforts as well as individual compliance were important in the absence of government funds for infrastructure development.

While this project has shown significant socioeconomic benefits from effective management, much more remains to be accomplished, specifically:

- organizing the stall owners and informal vendors and improving their skills for better services to tourists while increasing awareness on beach protection;
- improving beach security and safety;
- maintaining the facilities and more landscaping improvement; and
- establishing a sustainable financial mechanism to ensure long-term viability.

Lessons learned from the Ochheuteal Beach management over a decade of development and monitoring provided a useful model for sustainable tourism. The solid database, local knowledge, and experience as well as the demonstrated benefits of public-private partnership, strongly suggest that the beach management approach is viable and can be extended to other beaches throughout the entire coastline of Cambodia.

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Strengthening Capacities for Marine Conservation and Livelihood Development in Timor-Leste

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Key Message

- Application of integrated coastal management (ICM) principles and practices in developing nations such as Timor-Leste not only helps to avoid (or at least minimize) social and environmental risks during the process of economic development but also provides a step-wise approach to sustainable development across the multiple levels and sectors of government in the early phase of nation building.
- The lack of capacity in integrated planning and implementation is a challenge in developing countries. At the start-up of ICM programs, external assistance in building local capacity has proven to be effective. Over the longer term, capacity building is an integral part of ICM sustainability.

Abstract

Timor-Leste was established as a new democratic country in 2002 after over two centuries of colonization. During the period of political, administrative, socioeconomic, and

physical rebuilding, the identified priorities of the country were food security, institutional strengthening, and technical capacity building.

Timor-Leste joined PEMSEA as a country partner in 2006. The ICM program was focused on developing individual and institutional capacity for marine and coastal management, with special attention on development of alternative livelihood programs to improve living conditions and incomes of local people.

In collaboration with the Ministry of Agriculture and Fisheries (MAF), two districts, Manatuto and Liquiça, were selected to demonstrate: (a) ICM institutional arrangements, taking into consideration the existing administrative structure of the government with central line agencies having responsibility for project/program implementation at the national and local levels; (b) alternative livelihood development while protecting and conserving natural resources; and (c) capacity development at the national and local level.

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Background

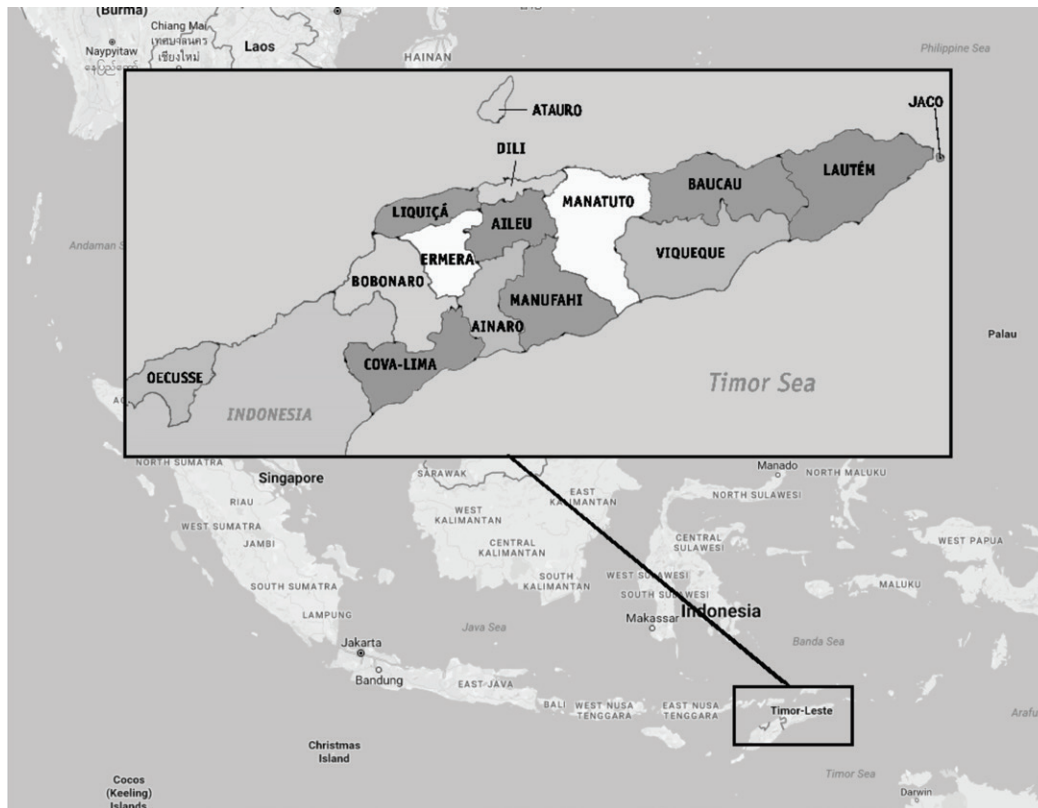
The Democratic Republic of Timor-Leste has a land area of 14,874 km² covering the eastern half of Timor Island, including the nearby islands of Atauro, Jaco, and Oecusse on the western side of the island (Figure 1). Its 735 km coastline is richly endowed with living resources, including fish, coral reefs, mangroves, and seagrasses as well as oil, minerals, and gas. The population of the country was 925,000 in 2007, and increased to 1.6 million in 2016.

The country has been in a state of administrative, economic, and physical rebuilding since 1999 following centuries of colonization and armed conflicts that destroyed much of the country's infrastructure, and financial and administrative systems.

The government structure in Timor-Leste consists of: national, district, subdistrict, and village (*suco*). There are 13 districts, including an enclave (Oecusse) in the Indonesian territory of West Timor. The government system as established in 2002 was centralized, and environmental management at the local level was the responsibility of district offices of the concerned ministries, in coordination with the local (district/subdistrict) administration offices.¹

The majority of Timorese depend on subsistence agriculture and fishing and continue to face extreme livelihood challenges in meeting their basic needs. Rugged landscapes, an inadequate road network, and limited transport services have made it difficult for most local workers to secure a stable source of income.

Figure 1. Map of Timor-Leste showing the district boundaries and the general location of Timor-Leste in the East Asian region.



¹ With the approval of Decree Law No. 3/2016 on the Statutes of the Municipal Administrations and Municipal Authorities, Timor-Leste is currently in the process of establishing the local government system.

and Soibada. It is the only district that traverses the entire width of the island with both northern and southern coastlines (Figure 3). Manatuto has a large catchment area, with permanent freshwater, and drains a large interior basin. It has coral reefs, mangroves, seagrasses, and associated fauna. The main economic activity was agriculture (fishery, forestry, and livestock). Fishing was primarily through hook and line, gill net, and spear. There was also small-scale salting, some freshwater fish culture, and various donor-supported irrigation and rural development projects. The district was considered a traditional subsistence community. Manatuto was considered as a potential location for establishment of a marine protected area (MPA) and for ecotourism development. The proposed ICM project was the development of a habitat conservation program for the northern coast, particularly in Suco Maabat and the development of alternative livelihoods.

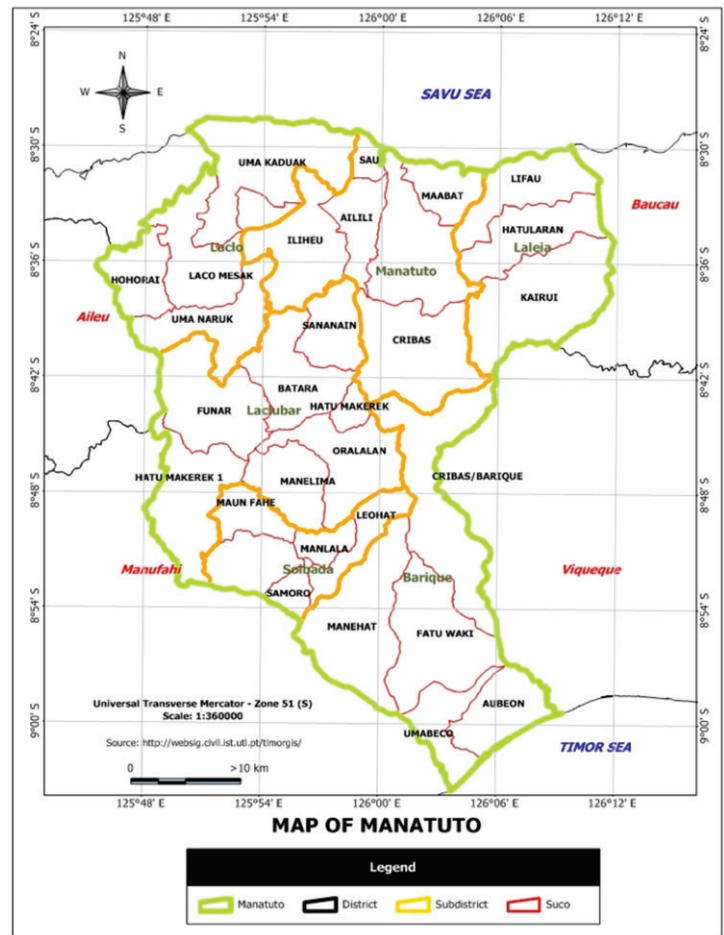
Approach and Methodology

Considering the lack of data and technical capacity on coastal and marine resources management in Timor Leste, capacity building on ICM and alternative livelihood development were implemented in parallel. Furthermore, capacity development activities were undertaken jointly at the national and local levels. The following were key stages in the ICM and alternative livelihood development process:

1. Preparatory stage

Initial project coordination and management mechanism. Three technical staff were assigned from the Fisheries Resources Management unit of the National Directorate for Fisheries and Aquaculture (NDFa) to initiate and support the project. Two task teams composed of NDFa staff and the district fisheries officers of Manatuto and Liquiça were organized to support project implementation at the district level.

Figure 3. Map of Manatuto showing the subdistricts and the *suco* (villages).



Initial training on livelihood development for communities. Both task teams, upon being organized, initiated consultations with the local administration offices and communities in the identified pilot sites to introduce the project, identify priority concerns and needs, and build consensus on ways to address these needs.

From June to August 2009, training was conducted at both sites, aimed at establishing additional seaweed farms to increase current production, and improving methods of salt production that do not require the use of firewood (PEMSEA, 2010; Figure 4).

The training was provided to 33 participants in Suco Ulmera, and 50 in Maabat.

Figure 4. Training on saltmaking using solar drying (left) and on seaweed cultivation (right) in 2009.



2. ICM capacity development

ICM capacity building was first organized and conducted for the core staff (seconded from NDFA) of the Project Management Office (PMO) headed by the director of NDFA, district ICM coordinators, and key project participants/contributors at the national and local levels. This included regional, national, and on-site training/orientation and internships at the PEMSEA Resource Facility (Box 1).

Following initial training in 2009 and 2010, ICM Site Management Offices (SMOs) were established in the districts of Manatuto and Liquiça. ICM task teams composed of representatives from various agencies were established. These local task teams were coordinated by the district fisheries officers of MAF serving as ICM coordinators.

3. Baseline scoping for sustainable livelihood development

A baseline scoping for the development of sustainable alternative livelihood programs was conducted in 2011 (PEMSEA, 2011, 2013),

which generated a preliminary list of livelihood possibilities in the pilot areas, as well as a list of capacity building needs for task teams/working groups and the community groups/people's associations.

In consideration of local resources and skills, and the socioeconomic situation of Liquiça, Manatuto, and of Timor-Leste in general, livelihood possibilities were identified that were specific to each district as well as common to both. Longer-term possibilities and more immediate ones related to food security were also identified.

In terms of immediate livelihood possibilities related to food security, the following options were proposed for both districts: cacao production through intercropping; vertiver cultivation; livestock production; moringa cultivation for its numerous medicinal benefits; processing of root crops and peanuts; marine aquaculture; village-level eucalyptus oil production; tamarind processing; ecotourism; and nonproduction activities like trading and operation of a common service facility, e.g., shredding services for organic farms.

Box 1. Summary of ICM training at the national and local levels in Timor-Leste (2009–2012).



Figure 5. ICM Training in Bogor, Indonesia, in 2010 with participants from MAF in Manatuto, and Liquiça.



Figure 6. Training on Ecosystem Approaches to Managing Marine and Coastal Resources held in Dili in 2011.

- An **Internship program** for the PMO Coordinator was provided at the PEMSEA Resource Facility. The program was designed to enhance understanding of the approaches, strategies, activities, and tools for implementing the ICM project in Timor-Leste. (In addition, orientation on baseline assessment tools and alternative livelihood activities was conducted.)
- Key PMO staff and district ICM coordinators participated in **ICM Training** in 2010 and 2011 (Figure 5), and **Preparation of Local State of the Coast Reports** in 2010.
- A **Training Workshop on Ecosystem Approaches to Managing Marine and Coastal Resources** was conducted in Dili in 2010, jointly with the US Coral Triangle Initiative/Coral Triangle Support Partnership (US-CTI/CTSP), National Oceanic and Atmospheric Administration (NOAA), US Navy and MAF (PEMSEA, 2013; Figure 6). The training focused on ICM applications for sustainable fisheries management, and participated by representatives from the districts of Manatuto and Liquiça.
- In view of limitations in available baseline data/information, and technical support needed in preparing SOC reports, a **Training Workshop on Rapid Appraisal and State of the Coasts Reporting** was organized in Dili in August 2011 for representatives from PMO and SMOs, SOC Task Teams in Manatuto and Liquiça, ATSEA Project, CTI Project, and national agencies with mandate and information related to sustainable marine and coastal management (i.e., MAF, National Directorate for Environmental Services – Ministry of Economy and Development, Planning, Health, Tourism, Public Works, Education). The training was followed by hands-on application of the tools at priority sites in Manatuto and Liquiça. Community consultations and field validation surveys generated outputs that were incorporated into preliminary SOC reports for both districts.
- **ICM orientation of local leaders and ICM Task Teams** were held in Manatuto and Liquiça in March 2012 (PEMSEA, 2013). A major outcome of the orientation was the agreement to develop integrated action plans for the pilot sites to demonstrate interagency and multisectoral collaborations.

For Manatuto specifically, enhancement of existing production of fermented shrimp (*balisaun*) (i.e., improvement of the fermentation process) was popular nationwide. The small *balisaun* thrives only in Manatuto.

4. Training on alternative livelihood development

Based on the results from the livelihood development baseline scoping, an internship program was organized by PEMSEA. The program was conducted in the Philippines and focused on key aspects and approaches for the development of sustainable livelihood programs in local areas. Livelihood options and technologies were concentrated on the application potential in Timor-Leste and the two local sites. During the 10-week program in 2012, two ICM site coordinators and two PMO staff underwent orientation and hands-on training and exposure to:

- development and management of social enterprises, including social preparation, organizational development, business skills development, financial management and bookkeeping, savings and capital buildup mobilization, and community-led credit operations; and
- village-level production, value-adding, and enterprise operations related to saltmaking, seaweed farming and processing, fish and shrimp paste processing, and food processing

Figure 7. Examples of products prepared by the interns during the food processing training.



for various fruit and root crops (mango, banana, taro, sweet potato, cassava, peanuts, and moringa) (Figure 7).

Livelihood and coastal conservation development in Manatuto and Liquiça

With the support of MAF, coordination by the interagency ICM task teams, and support of the district administrators and various partners, the following activities were undertaken:

- (a) *Seaweed cultivation and seaweed and fish processing in Ulmera.* Training on processing and diversification of fishery products in Suco Ulmera in 2013 (PEMSEA, 2015; Figure 8) was conducted by the Fisheries Technology Unit of MAF, with 30 people coming from

Figure 8. Training on seaweed and fish processing in Liquiça (from left to right): orientation by the Fisheries Technology Unit of MAF, hands-on training on seaweed processing, and training on fish processing.



two community groups, each consisting of 15 members (13 women and 2 men). The training covered processing of seaweed into gelatin (*agar-agar*) and ready to eat and drink products, as well as fish drying and preparation of fish powder for condiments. The community groups were also trained on packaging, labeling, and hygiene and sanitation in food preparation, and provided with basic equipment including pots and pressure cookers.

Following the training, a facility was built in Suco Ulmera in 2014 to serve as common processing, packaging, storage, and marketing area for seaweed and fish products. This was aimed at further development of seaweed and fish processing as additional sources of livelihood for the community groups and their families, aside from selling unprocessed seaweed harvested from the farms.

- (b) *Coastal rehabilitation through mangrove planting and improving saltmaking methods in Ulmera.* A community group in Liquiça, consisting of eight members (including four women), and those who were involved in traditional saltmaking were trained in mangrove rehabilitation (Figure 9). More than 1,000 seedlings were planted near the area in 2013 and 2014 (PEMSEA, 2015).

Salt farming was a challenge in the area due to frequent flooding from the river. After several consultations, the community group agreed to convert the traditional saltmaking area to saltponds, which will be operated with the support of the private sector (Figure 10).

Other livelihood and conservation initiatives in Timor-Leste are presented in Box 2.

Figure 9. Mangrove rehabilitation in Liquiça (from top to bottom): mangrove nursery; newly planted mangroves in Suco Ulmera; and the then Secretary of State for Fisheries and the Administrator of Liquiça joining a mangrove planting activity in Ulmera.



Figure 10. Conversion of the traditional saltmaking area to commercial-scale saltponds (from left to right): Consultation with a saltmaking group; local ceremony/ritual to prepare for conversion; and flattening of traditional saltmaking area to create saltponds.



Box 2. Other livelihood and conservation initiatives in Timor-Leste.

Mangrove crab rearing in Suco Ulmera. As part of the integrated implementation of marine and coastal management projects, Ulmera was also selected as pilot site for the ATSEA Project being implemented by MAF. Five project staff from MAF and one coastal community leader received training on collection of crab seeds from nature, and mangrove crab culture and harvesting. Fifteen fishers representing three community groups in Ulmera were then trained on crab cultivation. Around 40 cages were deployed in the area. Support is needed by the groups working with the ATSEA Project to construct more sturdy cages and ponds. Mangrove rehabilitation efforts also need to be further intensified. (Lenoci, 2014).

Mangrove crab and milkfish rearing were introduced earlier in Ulmera by a project supported by the United States Department of Agriculture and implemented by the Agricultural Cooperative Development International-Volunteers in Overseas Cooperative Assistance (ACDI-VOCA) in collaboration with MAF. The project is working with 20 community groups (Lenoci, 2014).

Coastal improvements to support ecotourism. Other villages near Suco Ulmera were also involved in coastal conservation and improvement activities. In Suco Maumeta in Bazartete subdistrict, tree-planting activities were undertaken to improve coastal vegetation. With the support of an NGO and partner from the private sector, huts were built along the coast to attract visitors and support ecotourism development in the area.

Elsewhere, mangrove rehabilitation was done by another group in Suco Tibar also in Bazartete subdistrict.

Ecotourism resort run by a youth group. In Suco Vatuvou in Maubara subdistrict, a youth group called Haseko was guided and supported in developing the Hatuker, an ecotourism resort (PEMSEA, 2015; Figure 11). The youth group was established in 2013, composed of 10 members (3 women, 7 men), with ages ranging from 18 to 29 years old, coming from 10 families in the village. The youth group is registered in Liquiça district and Maubara subdistrict.

As the youth in the area have difficulty finding employment but wanting to be productive, they requested support from MAF and were assisted in developing the resort with one room that can be rented at US\$ 15/day, three open cottages, and a separate restroom. Construction was completed in 2014, with prospects to include additional cottages, a training/function room, and to develop a vegetable plantation and fishpond within the area. The youth group takes care of the maintenance and security of the resort. The district administrator provides support in kind, like food supply.

The resort has the potential to be an alternate destination for tourists, although it will need support from various partners to

Figure 11. Seaside huts in Hatuker resort.



Box 2. Other livelihood and conservation initiatives in Timor-Leste. (continued)

promote the area. There is potential for further improving the resort's facilities, and with additional attractions that feature local or traditional activities that may attract tourists.

Coastal and upland reforestation in Manatuto. The Suco Maabat seaweed farm initiated in 2009 was not sustained due to strong wave action. Saltmaking using firewood for fuel continued since this produced salt faster than solar drying. In order to minimize the environmental impacts of saltmaking, tree planting was introduced to the local communities in Maabat to rehabilitate some portions of the area and develop vegetation to support the saltmaking operations. In 2012, 500 casuarina trees were planted in Balak, while tree planting is being continued in adjoining areas (Figure 12). To ensure a sustainable source of firewood, tree species that grow faster than casuarina are being considered. Rehabilitation of mangrove areas was undertaken by Santalum, a local NGO.

In a village called Beheda in Laclo subdistrict in Manatuto, people sell firewood for a living, but they cut these from the mountains. They were guided into developing tree nursery and plantation to help reforest areas where firewood was being obtained. In 2014, a local NGO, also called Beheda, was established to develop and maintain the nursery (PEMSEA, 2015). The 16-member group received initial support from Santalum to procure materials, plastic bags, and seeds for the nursery.

Technical assistance was given by a member of the ICM task team from the Forestry agency.

Local capacity for integrated crop management using industrial trees, industrial crops, and perennial crops was also being developed through the Rural Development Project Phase 4 (2012-2017) under the German International Cooperation (GIZ) and MAF, which provides technical and material support for developing community nurseries, and processing and marketing of selected products (PEMSEA, 2015).

Marine conservation area in Lamsana, Manatuto. A 10 ha locally managed marine area (LMMA) was established in Lamsana Bay with support from the CTI Project and managed by a local community committee. Considering relevant national regulations, and those developed under the traditional system called "Tarabandu," a fishing ban is being enforced in designated "no-take" zones in Lamsana Bay (PEMSEA, 2015).

Seawall in Maabat, Manatuto. Flooding is a problem in Suco Maabat. In 2013, the ICM task team in Manatuto collaborated in preparing a proposal to repair a damaged seawall, which was submitted for funding under the integrated district development plan (PDID). The PDID was a new funding mechanism for the district at that time, as funds for local activities used to come directly from concerned national agencies. A budget of over US\$ 4 million was approved for the repair of the seawall, including construction of a floodway.

Figure 12. Coastal and upland reforestation in Manatuto (from left to right): mangrove nursery, upland reforestation, and community participation in reforestation activities.



5. Learning from other ICM experiences

Study tours were organized and conducted in ICM sites in other countries for the ICM task teams and representatives from national agencies and institutions to cultivate appreciation and encourage learning on how ICM programs were developed and implemented.

In 2013, members of the ICM task teams of Manatuto and Liquiça, together with representatives from Dili district, national agencies, and academe visited Batangas, Philippines (Figure 13). They were oriented on the ICM framework, process, and tools and how these were applied in the development and implementation of the ICM program in Batangas Province. They visited various sites that showcased good practices, including MPA management; ecological solid waste management; seaweed farming; and food processing.

In 2015, Timor-Leste representatives visited Bali, Indonesia, to learn from experiences in developing ICM programs and applications to sea turtle and mangrove conservation, mangrove crab culture, beach restoration and protection, and home (cottage) industries, among others (PEMSEA, 2015).

In 2017, representatives from the three municipalities² and MAF visited Sukabumi Regency in West Java,

Figure 13. Visit to a mangrove conservation area in Batangas, Philippines.



Indonesia. There, they learned about governance mechanisms in place that are sustaining ICM programs despite changes in political leaders and agency heads as well as the empowerment of communities to participate in environmental protection and resource conservation.

6. Establishing capacity building and technical support network at the local level

In the course of implementation of ICM capacity building and development activities in Timor-Leste, collaboration with two national universities, UNTL and UNITAL, were enhanced. In November 2015, the two universities were designated as PEMSEA ICM Learning Centers in Timor-Leste (PEMSEA, 2015). They were organized with a core team of specialists. The core team underwent ICM and special skills training-of-trainers programs organized by PEMSEA. The core team then was tasked with providing technical and scientific advice and assistance, as well as training in ICM development and implementation to the local ICM task teams.

Results

In line with priorities on developing local livelihoods and capacities for natural resource conservation, local livelihood from fishery products was developed alongside habitat rehabilitation efforts. Coastal conservation and improvement initiatives to support ecotourism development were developed. These initiatives have provided additional sources of income for the community groups, opened opportunities for further enterprise development, and enhanced their awareness and participation in natural resource conservation and their sense of responsibility in improving livelihood and environment (Box 3).

² With the development of the local government system in Timor-Leste, the districts are now called municipalities.

Box 3. Livelihood and enterprise development opportunities.

Following a training in 2009, initial seaweed harvests within a two-week period generated 50 bags of seaweeds sold at US\$ 0.50/bag, for a total income of US\$ 300 by community groups in Liquiça; and 40 bags of seaweeds sold at US\$ 0.60/bag, for a total income of US\$ 288 for community groups in Manatuto. Saltmaking within a one-week period generated 35 kg of salt sold at US\$ 1/kg for a total of US\$ 35 in Liquiça, while groups in Manatuto reportedly earned around US\$ 175. Communities also provided feedback on further needs to improve their operations, and MAF continued to facilitate the needed support (GEF Evaluation Office, 2012).

The MAF also made arrangements with the Ministry of Commerce and Industry and a grocer to support marketing of the food products. Schools near the area were also contacted as a potential market.

There is a need to continue improving facilities and the training of communities on various aspects of livelihood development, including food processing to enhance the attractiveness and competitiveness of their products in the market. In Ulmera, an existing problem on water supply also needs to be addressed in collaboration with concerned agencies.

The gradual but continuous capacity building on ICM at the national and local levels in Timor-Leste, in parallel with alternative livelihood development and natural resource conservation activities, strengthened the ICM mindset among people involved in various development and implementation activities from national agencies, local governments, universities, and other stakeholders. People who have been involved in the ICM programs are sharing their knowledge, skills, and experiences with others.

Measures are currently being undertaken to enhance interministerial coordination and collaboration at the national and local levels to support stronger ICM implementation in the country.

The local administrators (mayors) in Liquiça, Dili, and Manatuto acknowledged ICM and its potential applications in strengthening the capacity of governments to manage their local areas in light of recent government decentralization. The concept and processes of interagency coordination mechanisms and integrated planning and implementation have been welcomed as good practices that can be applied in the municipal systems (Box 4).

Partnerships with universities (ICM Learning Centers) were established, and provide a mechanism for accessing scientific and technical support. A technical support network was created, trained and mobilized to advise and assist national and local stakeholders in ICM development and implementation.

Partnerships are also being developed with other agencies, programs/projects, and NGO to demonstrate collaboration in achieving common objectives.

Lessons Learned

ICM principles and processes can deliver outputs and outcomes that help address key challenges to sustainable development.

The introduction of the ICM framework and processes in Manatuto and Liquiça, was timely as the local governments were developing capacities and mechanisms for sustainably managing their local areas and resources.

As food security was a priority of the government, alternative livelihood development served as an entry point for introducing ICM to local areas.

Box 4. Scaling up ICM implementation in Timor-Leste.

With better knowledge and capacity of the ICM development and implementation framework, processes, and applications, and enhanced technical support network, the ICM programs in Manatuto and Liquiça were refined in support of the decentralization and establishment of the local government system in Timor-Leste. With support from the district administrators who have gained some level of budgetary power and direct authority over most of the offices operating at district level following the inauguration of the municipalities in September 2016, the ICM coordination and management mechanisms are being improved and considered for integration into the new local government structures.

The focus of ICM program has also scaled up. The one in Liquiça continues to support the development of alternative livelihood programs, while also improving fisheries management, climate change adaptation and disaster risk reduction and management in selected priority sites.

Manatuto also continues to develop alternative livelihood programs, sustainable fisheries management, and habitat

restoration and protection in selected pilot sites in the north coast, building on the work in Balak and LLMA in Lamsana.

Dili Municipality committed to developing an ICM program, initially demonstrating how it can help enhance the effectiveness of MPA management in Atauro Island previously established by MAF under the ADB-supported Coral Triangle in the Pacific (ADB-CTP) Project. Further development of the MPA is ongoing in collaboration with Conservation International.

Data gathering for the updating/preparation of SOC reports and conduct of risk and vulnerability assessments have been undertaken in the three sites to serve as inputs for preparing long-term coastal strategies and implementation plans for incorporation into municipal development plans.

Collaboration with the ATSEA Project to establish a project in the southern coast in Manatuto will be undertaken to support the implementation of the coastal strategy in that part of the district.

Capacity development on ICM concepts and applications was carried out simultaneously at the national and local levels, concurrent with capacity building on alternative livelihood development for government officers at those levels and communities.

Activities were conducted and adjusted considering available data/information, human resources, and capacities. As such, support provided to community groups in further developing their livelihood programs was in pace with the capacity building of implementing teams.

Coordination was a big challenge, involving regional, national, and local levels. In addition to developing interagency coordination and cooperation at the local level, the centralized government system also required intensive coordination between local and national levels. In view of limitations in the communications system in the country and various factors, coordination was not always optimal.

Budget allocation was also centralized, and local administrations and other agencies depended on funding from their national offices.

Various factors constrained faster implementation of activities in the districts, but the consistent strong support from the top leadership of MAF, dedication shown by the local interagency ICM task teams and district administrators, the continuing interest of the community groups to be part of the program, and ongoing capacity building on ICM and livelihood development kept the programs moving forward, albeit at a slower pace.

Due to the centralized government system, a national policy and a national interagency coordinating mechanism to support and guide ICM development and implementation at the local level were necessary. A national ocean policy to guide integrated management of marine and coastal areas in the country has been prepared and submitted to the

Council of Ministers for review. In conjunction with the development of the national ocean policy, establishment of an interministerial coordination mechanism to support marine and coastal management programs is under discussion.

The experience in Timor-Leste has shown that effective implementation of ICM at the local level requires addressing priority needs of local people.

Continuous engagement and encouragement of people who have worked with the ICM programs are important in order to develop program ownership and enhance their confidence to defend and promote consistently what they have learned. There is, however, a further need to develop systematic capacity development and information, education, and communication system on the importance of managing coastal and marine resources in an integrated manner, and to continue developing leaders/champions at the national and local levels.

The ICM programs in Timor-Leste need to further develop, considering the continuing priority for food and nutrition in the country; the lack of a national fisheries strategic plan; and the forthcoming economic and infrastructure developments in the local sites, such as a port in Tibar, Liquiça, and a special zone for social market economy in Atauro Island.

Further development of ICM programs also need to take advantage of the increasing recognition of the importance of sustainable utilization of marine and fisheries resources and the development of 'blue economy' in the country taking into account the process of government decentralization.

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Protecting and Sustaining the Ecological Functions of the Inshore Fish Spawning Grounds in the Yellow River Delta

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Key Message

- The ecological functions of inshore fish spawning grounds in the Yellow River estuary were degraded in the past few decades due to a dramatic decrease in freshwater discharge and sediment load.
- A water-sediment regulation (WSR) scheme, which has been incorporated as an essential management measure of the Dongying integrated coastal management (ICM) program, has helped protect and sustain these ecological functions.

Abstract

The Yellow River, the largest river in northern China, plays an essential role in maintaining the biogeochemical processes and ecological functions of the estuary and coastal ecosystems in the Yellow River Delta. The Yellow River

estuary is an important spawning and fishing ground and habitat for many migratory commercial fish species of Bohai Sea and Yellow Sea. In the past few decades, there was a dramatic decrease in freshwater discharge and sediment load of Yellow River due to the combined impacts of climate change and increasing anthropogenic activities. This has considerable socioeconomic and ecological implications and hence, the need to manage water resources and sediment loads of the Yellow River delta. A WSR scheme was started in 2002 with good results and was incorporated as an essential management measure of the Dongying ICM program. Although positive ecological impacts were evident after over 10 years of WSR implementation, new challenges require adaptive measures to improve the current WSR to further protect and sustain ecological functions of inshore fish spawning grounds. This case study provides the rationale leading to implementation of the WSR scheme and identifies areas for further improvement.

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Background

The Yellow River (Huanghe) is the second largest river in the People's Republic of China and the sixth longest in the world. It originates from the northern Qinghai-Tibet Plateau, flows eastward through the soil-rich Loess Plateau and the flat alluvial plains, and ultimately discharges into Bohai Sea (Figure 1). It flows through nine provinces in the country.

The Yellow River spans 5,460 km, has a wide drainage basin covering about 752,000 km², and exhibits a variety of geological and climatic features. Approximately 60% of its water is from the upper reaches of the Qinghai-Tibetan mountain ranges while about 90% of its sediments are derived from the middle reaches which cross the Loess Plateau. In the lower reach, from Huayuankou (hydrological) Station to Lijin Station (Figure 1), the river is characterized by raised riverbeds of up to several meters (locally > 10 m) above surrounding areas as it was subjected to frequent flooding in the past.

Each year, Yellow River discharges large amounts of freshwater, sediment, and nutrients into Bohai

Sea. It plays an important role in maintaining the biogeochemical processes and ecological functions of the estuary and adjacent coastal ecosystems, as well as maintaining the morphological characteristics of the delta. The Yellow River estuary is an important spawning ground and habitat of many commercial migratory fish species of Bohai Sea and Yellow Sea. It also supports the major fishing grounds in northern China Sea contributing up to 40% of the total fish catch in Bohai Sea (Shan, et al., 2013).

Compared with other large rivers of the world, Yellow River has distinctive characteristics of high sediment load and low water discharge, thus rendering the river yellow. The suspended particulate concentration is over 20 kg/m³, which is more than 100 times higher than most other large rivers (Milliman and Ren, 1995). Under normal conditions, water discharge from the river is highly dependent on the monsoon, with most of the runoff occurring during the flood season (July-October). Since the 1960s, in order to meet the demand for water (mainly for agricultural irrigation) and to prevent flooding, more than 3,000 reservoirs were constructed in the river

Figure 1. The Yellow River basin and the locations of the four largest reservoirs and major hydrological stations in the lower reaches (adapted from Yu, et al., 2013).

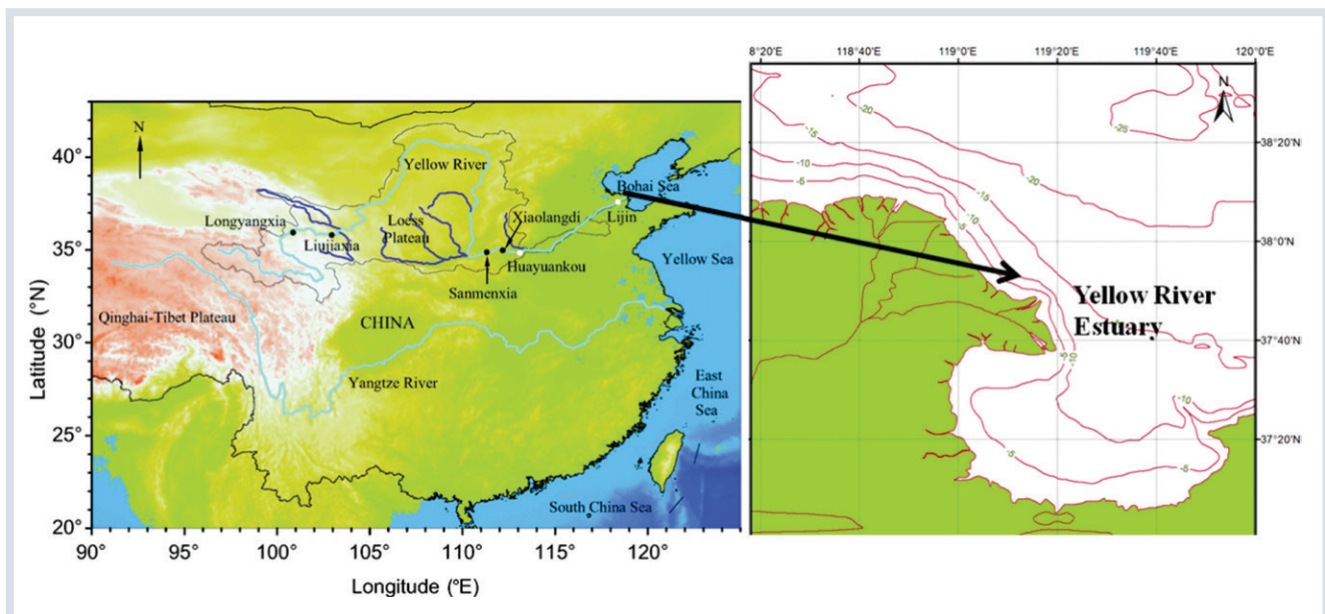
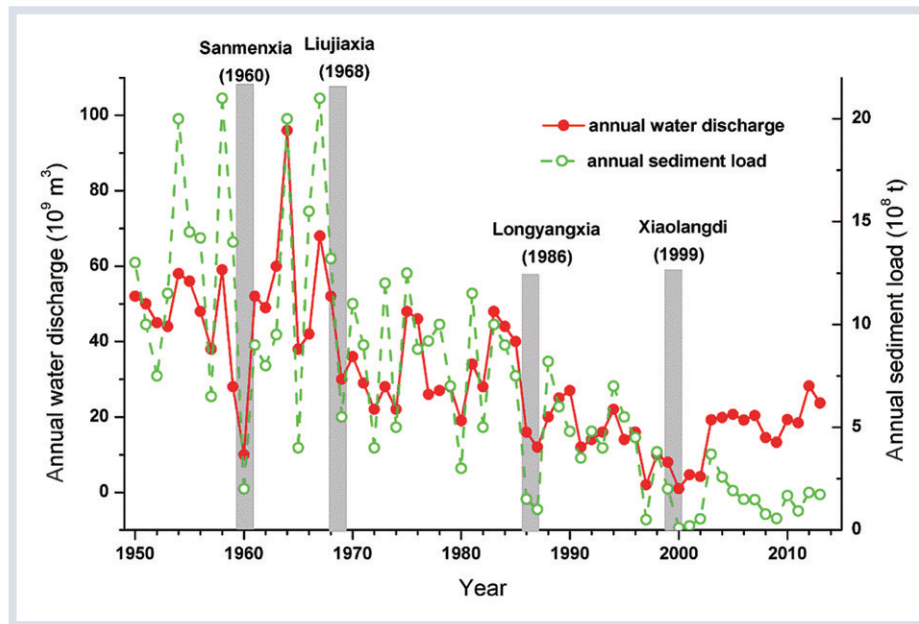


Figure 2. Long-term variation of annual water discharge and sediment load of Yellow River (Wang, et al., 2007; YRCC, 2012, 2013).



basin with a combined storage capacity of $57.4 \times 10^9 \text{ m}^3$ that virtually matches the average annual discharge of the basin. Among these, four major reservoirs (i.e., Sanmenxia, Liujiaxia, Longyaxia, and Xiaolangdi, constructed in 1960, 1968, 1986, and 1999, respectively) play an important role in the regulation of water supply and retention of sediments (Wang, et al., 2006; Figure 2). As a consequence, the water regime of the Yellow River has changed from one regulated through natural (monsoonal) forces to a highly-regulated hydrologic system (Yu, et al., 2013). After the construction of large dams and reservoirs in the river basin, the seasonal variability of the river discharge considerably weakened. These changes have significant impacts on freshwater supply to the millions of people living in northern China.

The Yellow River is a major source of freshwater for the more than 107 million people living around the river basin. Since the 1970s, water consumption in the river basin increased due to population growth, as well as extensive agricultural development (Huang and Fan,

2004). Dramatic decline in water and sediment discharges of the Yellow River was observed in the past 60 years, especially since the operation of Liujiaxia reservoir in 1968 (Figure 2). Taking the average annual discharge level of 1950–1968 as the reference level, water discharge decreased to 66.9%, 30.8%, and 30.3% of the reference level during 1969–1985, 1986–1999, and 2000–2010, respectively, according to the Lijin Station records (Wang, et al., 2007; Yu, et al., 2013). Since 1972, the zero-flow events in the lower reach of the Yellow River have become a major concern. There were 1,088 dry-channel days from 1972 to 2000, including 86 days in the 1970s, 105 days in the 1980s, and 897 days in the 1990s (Fan and Huang, 2008). The number of zero-flow days peaked at 226 days in 1997, affecting 704 km of channel upstream from the river mouth.

Correspondingly, the sediment load showed a synchronous decreasing trend with the water discharge. The average annual sediment load showed stepwise decreases to 63.2%, 30.1%, and 10.7% against the reference level during 1969–

1985, 1986–1999, and 2000–2010, respectively (Wang, et al., 2007; Yu, et al., 2013).

The altered temporal and spatial distributions of the Yellow River water discharge and sediment load were the result of interaction between climate change and anthropogenic activities, including extensive construction of dams and reservoirs; and intensive implementation measures for soil and water conservation, water consumption and river use regulation. Approximately 51% decrease in the water discharge to the sea was attributed to natural impact represented by decreasing regional precipitation, and 49% mainly to anthropogenic impacts in the river drainage basin (Wang, et al., 2006).

Salinity is one of the most important factors influencing coastal and estuarine ecosystems, and is easily affected by river runoff. With the declining freshwater input to the coastal sea, the average sea surface salinity (SSS) increased by 2 parts per thousand (ppt) in Bohai Sea and by as much as 15 ppt in Laizhou Bay, south of the Yellow River Delta (Lin, et al., 2001; Wu, et al., 2004).

Corresponding with the decrease in runoff from the Yellow River and the reduction of low salinity area ($S < 28$ ppt) in the delta, the diversity, abundance, and recruitment of fish species in Bohai Sea declined, particularly for the fleshy prawn (*Fenneropenaeus chinensis*). During the main spawning period in spring of 2008, the density of fish eggs decreased to ~30% of the 1982 level (Wang, et al., 2010). In addition, the synchronous decrease in sediment flux to the sea caused alterations in the Yellow River estuary coastline, thereby changing the circulation patterns. These changes further affected the distribution of fleshy prawn eggs and its nursery ground in Laizhou Bay (Huang and Su, 2002).

Coupled with intensive fishing activities, the composition of fish population has changed significantly. Since the 1980s, the dominant,

large-size, high economic value, demersal species were replaced by short-lived, low-trophic-level, planktivorous, pelagic species (Jin and Deng, 2000; Figure 3). Traditional commercially targeted fishes, such as the largehead hairtail (*Trichiurus lepturus*), red seabream (*Pagrus major*), and Pacific herring (*Clupea pallasii*), became locally extinct (Shan, et al., 2013). This shift in composition and abundance resulted in major changes in the biological cycle and restoration of the traditional fishery resources.

Approach and Methodology

To alleviate the sharp decrease in freshwater flux to the sea and unfavorable channel deposition of sediments in the lower reach, the Yellow River Conservancy Commission (YRCC) initiated WSR in 2002. The WSR is a human-controlled operational scheme which uses technology to manipulate floodwaters, mainly from the Xiaolangdi reservoir, to deliver the sediment and scour the lower reaches. The WSR is usually implemented once a year during mid-June and lasts for about 20 days. During the WSR, an abrupt increase in water and sediment discharge occurs at the river mouth. The flood amplitude during operation of WSR ranged from 2,400 to 4,000 m³/s in the lower reach during 2002–2010 in comparison with <1,000 m³/s when WSR was not in operation (Yu, et al., 2013). Thus, the operation of WSR significantly changed the runoff seasonality of Yellow River from a monsoon-controlled nature to a highly human-regulated system.

During the short-duration of the discharge pulses, about 27.6% and 48.9% of the annual water and sediment, respectively, were delivered to sea (Yu, et al., 2013).

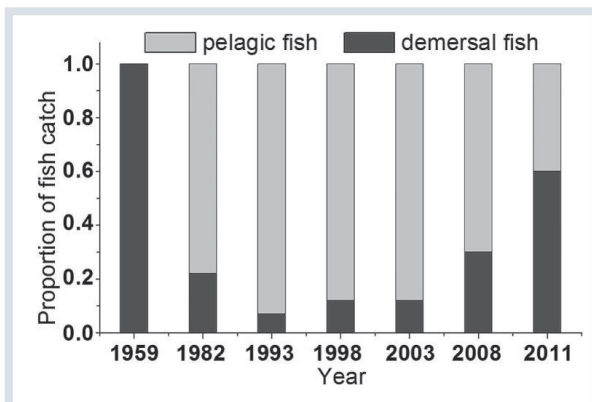
Through WSR, it was expected that: (1) the abrupt water discharge would reduce the riverbed and prevent flooding in the lower reach of Yellow River; (2) the sediment load would help maintain the stability of Dongying coastline; and (3) the

freshwater and nutrients discharged into the sea would help maintain the spawning ground function of the Yellow River estuary. These functions were linked with the mandates of several government departments such as YRCC, the Water Resources Bureau of Dongying, the Ocean and Fisheries Bureau of Dongying, and others. Hence, WSR was incorporated as an essential management measure in the Dongying ICM program, which started in 2005.

Results

The river channel in the lower reach was markedly scoured and its water transportation capacity significantly improved. No zero-flow event was recorded since the operation of WSR and the freshwater flux to the sea gradually increased in recent years. This facilitated positive ecological responses: (1) the low salinity area ($S < 28$ ppt), which is vital to sustain fish spawning, exceeded 370 km² during June – November from 2004 to 2009 (Xiao, et al., 2012); (2) the density of fish eggs in the Yellow River estuary increased from below 1.5 ind/m³ in 2006 to over 2 ind/m³ in 2014 (unpublished data); and (3) the proportion of demersal fish in the total catch gradually increased from about 12% in 2003 to 30% in 2008 and exceeded the proportion of pelagic fish in 2011 (ca. 60%) (Shan, et al., 2013; Figure 3).

Figure 3. Proportion of fish assemblage structure caught in Yellow River (Shan, et al., 2013).



Lessons Learned

Opportunities to improve the current WSR scheme. Although there was a positive ecological impact on the Yellow River estuary, there are still opportunities to improve the current WSR scheme. Generally, WSR activities are performed in mid-June or early July, but the main spawning period for most fish species is in May (Jin, et al., 2013; Shan, et al., 2013). This mismatch in freshwater replenishment time cannot provide sufficient flow to the low salinity area for spawning (Xiao, et al., 2012). In addition, the short-duration sediment discharge pulses had a great impact on the benthic environment. Field investigations in the Yellow River estuary during 2004–2010 showed that the biomass and individual density of benthos around the river mouth were significantly lower than those of the surrounding areas. Therefore, the time, duration, amplitude of flood peaks, and volume of released water should be further adjusted via the WSR scheme in order to meet the ecological freshwater requirement of the estuary and sustain the ecological functions of inshore fish spawning grounds.

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Transforming Pond Culture Practices in Dongying (PR China) to Reduce Environmental Degradation and to Achieve Sustainability

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Key Message

- The successful efforts of the Dongying City government to improve pond culture practices through the introduction of ecological farming and management techniques have effectively transformed the current unsustainable and environmentally harmful pond culture practices into a technologically and ecologically based aquaculture industry in the Yellow River delta.
- Modern ecological marine aquaculture is practiced by using seawater in three approaches: (1) using the ocean's natural processes for farming; (2) closing the nutrient cycle through multitrophic farming; and (3) applying industrial management standards. These approaches have significantly reduced the concentration of nutrients in the coastal area surrounding Dongying City, which is an important breeding base for sea cucumber and a significant supplier of eco-aquaculture products in PR China. This in turn has added social and economic benefits to the city.

Abstract

Four decades ago, extensive areas along the Yellow River delta were converted to fish ponds for the cultivation of high value marine commercial species such as shrimps, crabs, abalones, and sea cucumbers. This resulted in serious environmental degradation, higher production costs, contamination of food products and unsustainable aquaculture practices. In line with the provincial policy to establish an ecologically efficient economic program in the Yellow River delta region, Dongying City government successfully developed 20,000 ha of its coastal areas utilizing appropriate pond cultivation technology, based on ecological principles, and meeting international health standards. From 2007 to 2013, the total coastal areas applying such modern culture practices has increased by 58% from 66,000 ha to 104,000 ha, and production by 50% from 222,198 tons to 333,167 tons.

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Dongying City adopted an ICM program in 2009 and since then has effectively utilized institutional coordinating mechanisms, coastal use zoning schemes, and area-wide management dynamics to strengthen the development and management of innovative pond culture practices, effectively transforming unsustainable pond culture practices into a booming marine aquaculture industry in the Yellow River delta. Several good lessons were learned from the initiatives, particularly in building on national and provincial government policies, ensuring product safety, promoting economic and environmental sustainability, securing scientific and technological support, and improving the livelihoods and income of participating fish farmers.

Background

Four decades ago, large areas of coastal lowland in the Yellow River delta were converted to fishponds for the cultivation of shrimps and other high value marine fish. However, because of the collapse of the shrimp culture industry worldwide due to high production cost, as well as inappropriate and unsustainable farming methodology, large areas of ponds in the Yellow River delta were abandoned while some were converted for sea salt production or farming of other marine species such as abalones and sea cucumbers.

Widespread farming techniques required heavy inputs of commercial feeds for shrimp farming, or fertilizers to increase benthic algae or primary productivity in abalone and sea cucumber farming. Such aquaculture practices resulted in wastage of commercial feeds, increased sedimentation, bacteriological/virological contamination and high concentrations of nutrients in the water column. Collectively, this resulted in a high mortality rate of farmed animals due to oxygen depletion and diseases (Li and Chen, 2004). Uncontrolled or inadequately controlled application of antibiotics for disease prevention and treatment further

contaminated the aquaculture product and posed health concerns to consumers (Hu, et al., 2007).

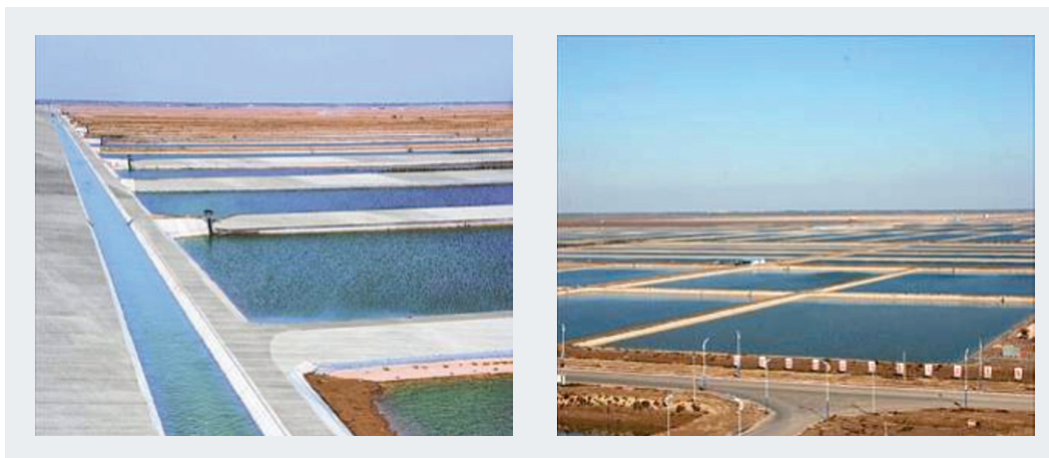
In 2009, the Chinese government called for the development of marine industries and establishment of modern industry clusters to boost economic growth. In May 2009, Dongying City adopted an ICM program, which included actions to achieve the dual objectives of developing the aquaculture industry and improving the marine environment through the demonstration of intensive and highly efficient modern aquaculture (Liu, et al, 2013).

This case study highlights the transformation of aquaculture practices in Dongying City into becoming sustainable through the improvement of concepts and techniques, and being fully aware of ecological carrying capacity and environmental health. Such forms of ecology-based aquaculture practices, known as “ecological aquaculture” in PR China, is a recent innovative practice that optimizes ecological and economic benefits. This case study underscores the effective use of the trophic relationship of the coastal ecosystem in the selection of suitable marine species for cultivation in an eco-pond system in the Yellow River delta.

Approach and Methodology

Gain political support

Since 2007, aquaculture was identified by the Dongying City government as a main innovative industrial area in alignment with the Yellow River Delta Efficient Ecological Economy Program. In March 2008, Shandong Province developed plans for the use of designated water areas and tidal flats for aquaculture. The provincial government also provided guidance on the efficient and rapid development of the area. On the basis of these policies, the Dongying government began to develop a 20,000-ha demonstration area for ecological aquaculture.

Figure 1. Aquaculture demonstration area of Dongying City.

By 2014, 67,000 ha of modern fishing demonstration core areas were constructed for ecological farming of sea cucumber and other seafood and for salt production (Figure 1).

Establish an interagency coordinating mechanism

The modern pond aquaculture was a fish farming system in which production and marketing processes involved the Marine Fisheries Bureau, Tax Bureau, Planning Bureau, Construction Committee, and other relevant departments. Dongying City established a special lead group to coordinate the Yellow River modern aquaculture demonstration project. Headed by the Dongying City Ocean and Fishery Bureau (OFB), the group supervised and monitored the development of the aquaculture industry and coordinated the activities among departments.

Use the ocean's natural processes for farming

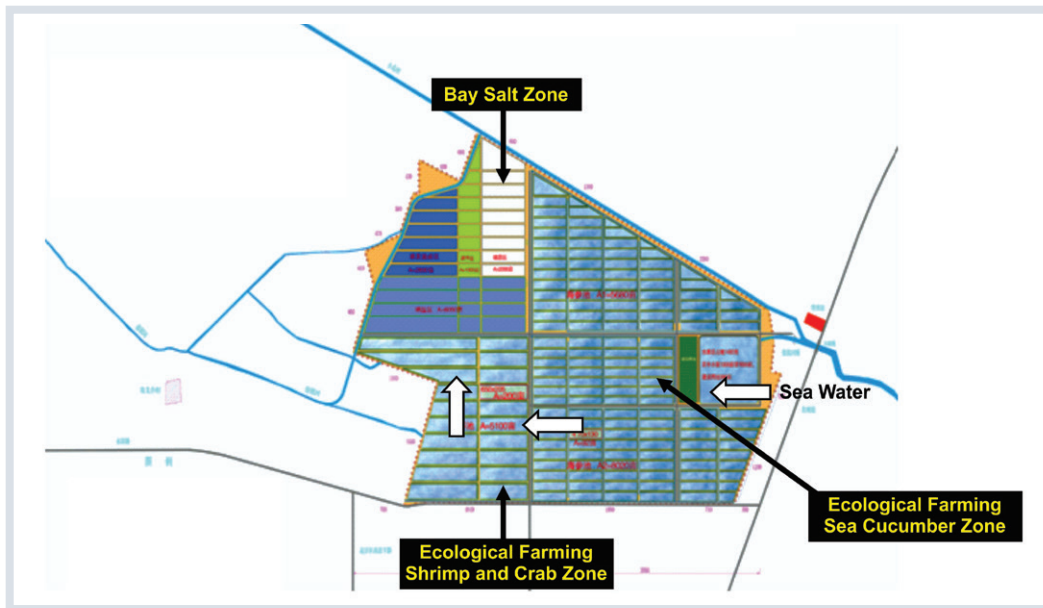
The ecological aquaculture in Dongying City demonstrated a cycle of healthy ecological farming (Figure 2). Farming of sea cucumber, shrimps, crabs, and *Artemia* (brine shrimp) was practiced using the concept of resource sharing and recycling where all aquaculture wastes were

fully utilized. Clean, grade I seawater was stored in a reservoir through natural tides and was then pumped into a sedimentation basin. After settling, high quality seawater was pumped into the sea cucumber aquaculture zone. Benthic algae flourished in the sea cucumber farming zone, which were full of rocks and sand. The seawater in this zone was replaced when there was an increase in algae abundance. Compared with the pond-farmed sea cucumber, the ecologically farmed stock was provided with a longer growth period because feed/bait and antibiotics were not added. Thus, good quality of seawater was maintained.

Use seawater multiple times

With evaporation, seawater salinity in the sea cucumber farming zone increased, making it unsuitable for growth. When this happened, seawater was then pumped into the shrimp and crab farming zone. Finally, with further evaporation, the seawater was then transferred into the *Artemia* farming zone. Ultimately, the highly saline seawater was processed to extract bromine salt and magnesium chloride. This model of seawater reuse (Figure 3) proved to be a more efficient use of water resources (Han and Ziao, 2010).

Figure 2. Efficient seawater cycle in ecological aquaculture of Dongying City.



Close the nutrient cycle through multitrophic farming

Under the ecological aquaculture system in Dongying City, different species living under various trophic levels were farmed in such a way that nutrients in the farming areas were recycled (Shen, 2011; Zhou and Xu, 2014). Under the former pond-farm mode, fertilizers were added to the sea cucumber pond to produce sufficient benthic algae as food for the sea cucumbers. Inevitably, some of the algae and feces ended up in the water column. Under the ecological aquaculture mode, sea cucumber were raised with natural nutrients present in seawater. After seawater was discharged from the sea cucumber farming ponds into shrimp farming ponds, the nutrients and organic particles present in the discharged sea water became food for the shrimp and crab stocks boosting their growth.

Apply industrial aquaculture management practice

Dongying City actively applied modern management practices to improve aquaculture operations. The city adopted industrial aquaculture management practices with standardized

production and management procedures to ensure the quality of aquaculture and its products.

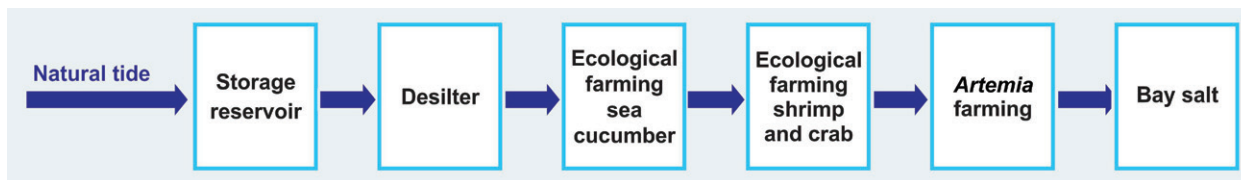
Tighten quality and safety surveillance

In order to produce healthy aquaculture products, a quality monitoring system was implemented by the Dongying OFB. Education activities were conducted to improve awareness of the quality and safety of aquaculture products. A random testing mechanism for aquaculture products was also implemented. The entire business process strictly adhered to legal provisions that guarantee the quality and safety of aquaculture products. Quality and safety were ensured through compliance with hazard analysis and critical control points processes.

Strengthen law enforcement

Supervision and management of ecological aquaculture were strengthened. The Dongying OFB organized and implemented monitoring and inspection systems to ensure the quality of aquaculture products. Legislation and

Figure 3. Seawater flow system under circulating model.



administrative orders on the operational, quality control and management of ecological aquaculture systems included the Shandong Province State-owned Waters Mudflat Aquaculture Management Regulations, the Interim Measures of Shandong Province for the Administration of Production Licenses for Aquatic Fingerlings, and the Dongying City Comprehensive Management Program for Rural Aquaculture Product Safety.

Build aquaculture practices into a business

Dongying City set up the Yellow River Estuary Fisheries Ltd. It was responsible for the development and construction of modern aquaculture facilities in the designated aquaculture zone. It also led in the coordination and management of industrial aquaculture demonstration practices.

Results

Significant reduction in nutrients

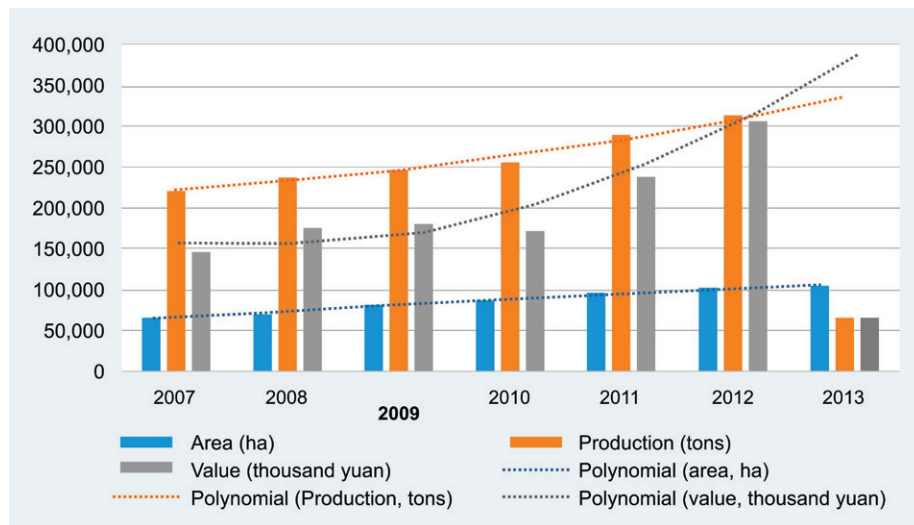
Dongying City is recognized as a major supplier of eco-aquaculture products. The high quality sea cucumbers grown using the ecological aquaculture technique are typically sold at double the price of those from pond-grown areas. Pollution in the seawater column is minimized due to reductions in feed and antibiotic use. Table 1 summarizes the monitoring results at two locations of the aquaculture farm in 2007 and 2014, showing lower values of COD, nitrite, ammonia nitrogen, and petroleum in 2014 compared to 2007. Today, Dongying City is recognized as an important sea cucumber breeding base in PR China.

Table 1. Monitoring results of eco-aquaculture farms in 2007 and 2014.

Date	depth	pH	salinity	DO	COD	phosphate	nitrite	nitrate	ammonia nitrogen	petroleum
m/d/y	m		PSU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
10/15/2007	5.4	8.13	25.14	8.00	5.09	0.026	0.035	0.05	0.299	0.06
10/22/2014	6.5	8.00	29.19	8.34	0.927	0.00597	0.0477	0.269	0.104	0.0385

Source: Dongying OFB, Shandong, PR China

Figure 4. Aquaculture area, production, and production value in Dongying City from 2007–2013. (Dongying OFB, Shandong Province, PR China).



Increased social and economic benefits

The aquaculture area in the city increased by 58%, from 66,000 ha in 2007 to 104,000 ha in 2013. In the same period, production increased 50%, from 222,198 tons to 333,167 tons, which was commensurate to the increase in area. However, the annual sales value of aquatic products increased 158% from RMB 176 million (US\$ 27.5 million) in 2007 to RMB 379 million (US\$ 59.2 million) in 2013 (Figure 4). It is thus clear that economic returns from eco-aquaculture were much higher than from traditional aquaculture practices.

In accordance with the aquaculture industry development plan, Dongying City is targeting to develop 140,000 ha of aquaculture farms by 2020, with annual outputs of 660,000 tons of aquatic products and an increase of annual average income of fishers to US\$ 4,500.

Lessons Learned

Align with national and local development strategies

Ecological aquaculture demonstration and replication are only possible with strong backstopping from national, provincial, and municipal governments. An enabling land and sea use zoning plan, coordination mechanisms, legislation, law enforcement, and quality control and monitoring have created a business and investment landscape for ecological aquaculture.

Partner with academia for technical support

To overcome the technical barriers to investors, the demonstration zone entered into partnership agreements with Yantai University and Qingdao Agriculture University. The partnership provided technical support and transfer of technology for breeding of new varieties, disease prevention and control, monitoring of water quality, and establishing quality criteria of farmed products. Research projects were also conducted by the two universities to find solutions to technical issues.

Incentivize participation by local investors

At the early stage of demonstration, about 150 ha of land were allocated for the Industry to Benefit Household Project. The project provided land, management support, construction, and other incentive measures to local investors, such as fishers, fishers' associations, and cooperatives. Training opportunities were conducted on the standardization of aquaculture management processes, large-scale farming, and intensive aquaculture farming. These incentive measures attracted investments from locals who ultimately benefited from the investment.

Facilitate the development of the supply chain from aquaculture farming, processing, marketing, and logistics

To facilitate large-scale aquaculture industry development, the Dongying City government leased 200 ha of land to investors to build and operate processing facilities for aquatic products. The processing industries provided job opportunities for thousands of skilled workers. Meanwhile, trade centers were registered to facilitate market access of aquatic products. Roads were built to provide easy access to highways which led to key consumer markets.

Enable a growing consumer market conscious of food safety

Through its modern fisheries demonstration and replication program, Dongying City developed and implemented strategies to target a higher percentage of the market share of its aquatic products. Meanwhile, developing its ecological aquaculture products into well-known brands was also initiated by creating a market for ecologically friendly products. The strategies have proven successful with the increasing population of middle-income consumers. In turn, the enabling legal, institutional, and market-oriented approaches and mechanisms will leverage rapid transformation

of the traditional aquaculture sector into a more sustainable and modern fishery model in other areas and markets.

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Improving Sanitation through Community-based Solid Waste Management: Experiences in Lao PDR and Cambodia

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Key Message

- Effective solid waste management (SWM) among unserved, poor communities involves changing the behavior and practices of households, including strengthening their environmental awareness, role, and responsibility in the provision of a safe and healthy community.
- The success of a community-based waste management can also depend on the support of the private/public sector that manages the infrastructure and SWM facilities. Partnerships between local communities and the private sector in SWM can be successful if implemented with the full awareness of the needs of both the community and the private sector.
- A socialized user fee scheme can ensure that all users of the SWM system pay for services, but within their respective capacities. This can result in community

ownership and financial viability and sustainability of the system.

Abstract

Solid waste has become an increasing concern in many developing countries, especially in poor urban areas, due to the rapid rate of population growth, increased per capita consumption, the complexity of waste and inadequate infrastructure to manage waste (Veasna, et al., 2006). While effective SWM is crucial to protecting human health and the environment, infrastructure in developing countries, including roads, waste management facilities, and equipment, are usually limited, making it difficult to effectively manage waste.

This case study documents experiences in selected urban areas in Cambodia and Lao PDR. The experiences show that the success of community-based

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waste management relies on a combination of approaches that addresses primary (from households to identified transfer points) and secondary waste collection (transfer points to dumpsites/landfill). This entails getting broad cooperation among various stakeholders and making SWM an economically viable endeavor for the community and the private sector.

Background

Inadequate waste management and sanitation have consequences on the health and well-being of communities and the local environment. In Sihanoukville (Cambodia) and the Sedone Provinces of Champasack, Saravanne, and Sekong (Lao PDR), unsightly solid wastes were a major concern especially in locations relying on tourism for economic development and livelihoods. While a comprehensive analysis to determine the social and environmental impacts was not carried out, community members were aware of the problems related to the disposal of solid wastes, including blocking natural drainage systems resulting in flooding and the proliferation of vermin spreading diseases and causing illness to local inhabitants. Poor management of solid wastes was also having negative effects on the economy of the area, including devaluation of property, loss of investments (e.g., tourism, fisheries) and job opportunities.

The Sihanoukville ICM Program in Cambodia identified SWM as a priority concern in its Coastal Strategy Implementation Plan. A pilot project was initiated in Village 1 and Sangkat 4 in Sihanoukville Municipality in 2005, involving about 1,400 households (Veasna, et al., 2006; Figure 1).

When the Sedone Integrated River Basin Management Project in Lao PDR started in 2007, SWM was identified as a major concern especially in urban centers (DWR, 2007; PEMSEA,

2014). Similar to the Sihanoukville experience, a pilot-scale community-based SWM project was implemented in 12 selected villages in Sedone covering about 3,000 households. The objective of the project, implemented in 2011, was to address solid waste problems by strengthening local capacity to coordinate the implementation of SWM across different stakeholders.

Baseline studies in the Sedone River basin and the Sihanoukville Municipality indicated a daily per capita waste generation of about 0.3 kg to 0.5 kg, with urban areas producing the higher volume of wastes. About 45% of the waste produced was organic, while the rest was a mixture of nonbiodegradable/nonrecyclable materials. In Village 1, Sangkat 4 in Sihanoukville Municipality, there was no waste collection system with most wastes dumped in vacant lots in the village. In Sedone, waste was collected in Saravanne and Champasack Provinces twice a week while Sekong Province did not have a regular waste collection system (DWR, 2007; Sethy and Sothea, 2011).

Approach and Methodology

Organize lead teams at the village level where waste management problem is most evident

In both Sihanoukville and Sedone, three main problems were identified, namely: (1) limited awareness of the impacts of inadequate waste management on human health and the environment; (2) ineffective waste handling and collection systems; and (3) limited cooperation among private waste collection companies, communities, and local governments, resulting in poor services provided to communities.

To address these common problems, it was essential to get the community leaders involved at the beginning of the project to promote better understanding of the process of waste management and ownership. In Sedone, waste

Figure 1. Pilot scale waste management was implemented in Village 1, Sangkat 4, Sihanoukville, Cambodia, where no previous waste management scheme existed.



management teams were set up, composed of at least five members per team including the leader of the village, leaders of the youth and women's organization, heads or representatives of the security and environment units. The members were identified based on their critical role on waste management in the villages and their influence on the process. In Sihanoukville, the waste management team composed of leaders of the village, was organized with the provincial government providing technical and some financial support.

Upon organization of lead teams, workshops were conducted wherein the roles and responsibilities of the teams were discussed and agreed upon. The inception workshops also provided an opportunity for the villagers, representatives from the waste collection companies, and the local governments to participate in the planning process, thereby strengthening ownership of the project and getting better cooperation from villagers and the private waste collectors.

Determine what's wrong and why

To come up with a solution, it was necessary to first understand the socioeconomic characteristics, environmental concerns, and behavior towards solid waste. Interviews were undertaken and observations were recorded at the sites as part of the baseline assessment. By conducting baseline data gathering, the project team members were able to familiarize themselves with the local conditions and the behavior patterns at the respective sites. For instance, waste characterization enabled the teams to identify potential opportunities for improving management, such as the application of composting and recycling processes since a high percentage of the household wastes in the communities were biodegradable.

In both Lao and Cambodia, the Royal University of Phnom Penh (RUPP), Department of Environmental Science, played an important role in the conduct of baseline data gathering

and planning. This external support provided the provincial authorities with additional human resources and the required skills for baseline data gathering, analysis, and SWM planning. In both Sihanoukville and Sedone, RUPP was also tapped to provide support for local implementation, while gradually building the competence of the local teams in implementation.

Empower local stakeholders using a learning-by-doing approach

The RUPP support group provided training and on-site coaching in order to build the knowledge and skills of local teams. A “ladder” approach was used for the training, starting off from basic information on waste generation and the related social/human health and environmental issues, then moving into the concepts and approaches of improved waste management, and finally to concrete actions for improved waste management in the respective communities. In Sihanoukville, the local team members themselves became trainers for the village.

Define the community's role and a means to execute

One of the major constraints to improved waste management in Sedone and Sihanoukville was limited accessibility by waste collection trucks. To remedy the situation, it was agreed that the waste collection system should consist of two stages: (1) waste collected from the households would be deposited at a transfer station (primary collection); and (2) from the transfer station, which would be accessible by waste collection trucks, wastes would be transferred (secondary collection) to a final disposal site (i.e., dumpsite or landfill). In setting up the collection system, an understanding of community behavior as well as road access was necessary.

In Sihanoukville, a map of the transfer points was prepared (Figure 2). Based on the map, waste bins were installed and households were encouraged to utilize the waste bins. Since road access was poor within the community, a worker was assigned by

Figure 2. Community mapping and identification of transfer points.



CINTRI (Cambodia), the waste collection company, to collect the wastes from the transfer points. CINTRI then transported the wastes to the dumpsite.

In Sedone, the households mainly used baskets and plastic bags for waste storage. One rubbish bin was assigned for every ten households. The community leaders were responsible for ensuring that the households were disposing of their wastes using the assigned bins. From the transfer points, secondary waste collection and transportation service was provided by the local government in both Pakse and Salavane and by a private contractor in Thatheng.

Sustain the system through an equitable user fee scheme

An important and challenging dimension of waste management service was financing continuous implementation. A socialized user fee scheme was

developed for Sangkat 1, Sihanoukville. The idea was to “share” the burden of waste management across households, with relatively better off families paying a higher share of the waste management service. The monthly user fee was pegged from 1,000 riel (US\$ 0.25) to 8,000 riel (US\$ 2). The scheme is shown in Table 1 with the number of households and monthly collection. The scheme was based on two aspects: the number of family members and the type of dwelling or of construction materials used for the house. For instance, a family living in a relatively bigger house made of concrete would pay much higher than those living in smaller houses. Affluent families also tended to purchase more and create more wastes. The type of dwelling was used as a proxy indicator for wealth and income. The second criterion was the number of household members. Most households pay 4,000 riel or US\$ 1 per month for solid waste collection. By implementing the scheme, the village was able to collect US\$ 175 per month, which was used to maintain the primary and secondary waste collection services (Table 2).

This was not an easy task, particularly as some households were only renting, while others were

Table 1. Projected collections for the socialized user fee scheme for Village 1, Sangkat 4.

Proposed scheme	No. of households	Payment scheme (in riel*)	Total amount (in riel*)
1	20	8,000	160,000
2	20	7,000	140,000
3	20	5,000	100,000
4	120	4,000	480,000
5	50	3,000	150,000
6	30	2,000	60,000
7	1	1,000	1,000
		0	0
	261		1,091,000

*US\$1=4,000 riel.

informal settlers. Getting support from village leaders and engaging the households in regular dialogues resolved difficulties in collection.

User fee systems are usually established as projects mature and communities recognize the importance of sustaining the implementation. In Sedone, the pilot-scale project was unable to set up the scheme

Table 2. Actual collection and use of user fee for Village 1, Sangkat 4, Sihanoukville (October, 2007).

Actual collection				Use of user fee		
Proposed scheme	No. of households	Payment scheme (in riel*)	Total amount (in riel*)	Items	Description of monthly expense	Total (in riel*)
1	6	10,000	60,000	1	CINTRI second collection fee	350,000
2	10	5,000	50,000	2	Two workers (monthly paid)	300,000
3	78	4,000	312,000	3	3% expense for administration	23,040
4	108	3,000	324,000	4	Expense for maintenance of facilities	20,000
5	7	2,000	14,000	5	Others	10,000
6	4	1,500	6,000			
7	2	1,000	2,000			
8	46	0	0			
	261		768,000			703,040

*US\$1=4,000 riel.

due to legal issues. Despite this limitation, the cleanup activities and waste collection continued with public funding even after the pilot-scale implementation. The Province of Champasack has proposed a follow-up phase and expansion to cover more villages in the province.

Strengthen community awareness

A key strategy in waste management is to get stakeholders involved by engaging them in community activities, such as cleanups. In Sihanoukville, the initial activities focused on getting rid of the accumulated wastes in public areas in order to demonstrate the immediate impact of the project and generate stakeholder support.

In Sedone, public awareness materials, including stickers and brochures on SWM were developed and used in various campaigns. Regular community cleanup activities were also conducted by the village members to demonstrate commitment to waste management and to maintain cleanliness in the village. These events proved popular and were continued on a weekly basis even after the project ended in most sites. Consultations with community members indicated that a positive behavioral change among local people was observed through greater public involvement in cleanup activities and reduced incidences of burning wastes and dumping wastes into the drainage systems and river.

Develop the legal framework for waste management improvement

Using Lao PDR's Law on Environment Protection (LEP), local regulations on waste management were developed at district and village levels to provide a legal basis for implementation. In both Sekong and Saravanne Provinces, regulations were approved at the district level while in Champasack Province, a regulation was developed at the village level with support from the project and approval by the village committees (PCO, 2014).

Results

Improved cleanliness and sanitation

Early results are an important part of getting community buy-in. In Sihanoukville, an estimated 175 tons of accumulated waste in public areas were collected and properly disposed of at the start of the project. The visual and physical changes that occurred as a consequence of the initial cleanup sparked interest in the community to continue to participate in SWM improvements in the area.

In order to maintain cleanliness in Pakse, Champasack Province, waste collection was increased in frequency from twice a month to weekly service (Figure 3).

Village leadership continues after the pilot projects

Organizing teams and getting village leaders to eventually lead the process entailed on-site coaching, close guidance, and collaborative planning and implementation. At the start of the Sedone project, support was provided and made visible by the provincial authorities as the village leaders were still acquiring knowledge and skills in waste management implementation. Eventually, village leaders were able to mobilize community support for regular community cleanup, even after the pilot project ended, indicating the overall commitment to promote better sanitation in those communities.

In Sihanoukville, the village leader eventually became a key resource person in the expansion of coverage of SWM to other villages in the province.

Institutional arrangements established

Based on the experience of the pilot projects, village organizations have been set up to focus on improved SWM in Champasack Province. The organizations were composed of village leaders,

Figure 3. Cleaning up accumulated wastes.



senior/elderly people, women's groups, and youth associations.

Improved relationship between local government officials and stakeholders

The pilot-scale project was an effective exercise in getting communities and local government leaders to collaborate on community governance. By working together and showing visible changes in cleaning up the community, the stakeholders were able to see the benefits of collaboration and partnership, thereby improving understanding and trust in one another.

Demonstrated success resulted in scaling up the efforts

In Sihanoukville, the experience of the pilot-scale implementation was scaled up to cover more

villages in Sangkat 4. The growing recognition to address the problem of wastes generated more attention at the provincial and national levels, leading to enactment of policies and programs that assist urban centers across the entire province.

Challenges and Lessons Learned

Getting the basic system started

Experiences in the two countries have shown that, while a comprehensive system of waste management is ideal, the basic needs and capacities of the communities must be addressed first. In both situations, the basic need was to remove the waste from the communities in order to avoid human health and environmental hazards. The

implementation of waste segregation and recycling schemes can be introduced at a later point in time, when the basic setup has been established. For example, segregation of waste and waste recycling was introduced in collaboration with schools in Sihanoukville. Also, as people see the immediate impact of a clean environment, the basic system becomes its own advertisement.

Adapting to changes in behavior

The location and size of the waste bins were important in maintaining cleanliness of the community and in encouraging communities to dispose properly. This was one of the key considerations of the baseline assessment. However, as the system was implemented, it was essential to monitor and adapt to change.

In Sedone, it was observed that as communities began to understand the importance of proper waste handling and collection, the waste bins provided at the start of the pilot project proved to be insufficient in capacity, particularly when secondary waste collection was being carried out only once every two weeks. In response, waste collection by the private collector was changed to once a week. While there was an increase in the frequency, there was no corresponding increase in cost of collection among the households.

User fee scheme pays for services rendered

Collecting user fees was one way of sharing the costs of waste collection services between the local government and the households that benefited from the service. User fee schemes inherently entailed a process of consultation, awareness building, and negotiation among village leaders, households,

and local governments. A basic principle with such systems was that households pay within their respective capacities, but every household pays something. In addition, once the scheme was in place and implemented, transparency in managing the funds and demonstrating visible impacts were important in getting better compliance and collection.

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Implementation of the Port Safety, Health, and Environmental Management System at Bangkok and Laem Chabang Ports

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Key Message

- Ports and harbors are crucial centers of economic activity in East Asia, providing the gateway to domestic, regional, and international markets.
- The safety of port facilities, port workers, and the surrounding communities, and the protection of the environment are interconnected and synergistic elements in the management and operation of today's ports. Ports have an ever-increasing responsibility locally and internationally with regard to policy, legal instruments, and standards covering maritime safety, protection of marine environment, and sustainable development.
- The Port Safety, Health, and Environmental Management System (PSHEMS) is a unique and effective management system

that integrates three international standards (International Standards Organization [ISO] 9001, ISO 14001, and Occupational Health and Safety Assessment Series [OHSAS] 18001) that contribute to sustainable port management. PSHEMS provides ports with procedures for improving operational safety, safeguarding workers and surrounding communities, and protecting the environment and port installations, while enhancing the efficiency and quality of services being provided to customers.

Abstract

Port authorities and operators face a number of challenges with respect to the role and impact of ports in the sustainable development of coastal areas. The

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development and adoption of international safety, environment, and security standards by global bodies have emphasized that an effective management system must not only encompass operational activities, but also establish quality, safety, health, and environmental objectives and procedures into each process. To achieve sustainability of port operations, authorities and stakeholders should be able to: (a) manage the port's growth and development effectively; (b) ensure safety and promote the health and welfare of workers; and (c) adhere to globally recognized environmental quality standards. To do so systematically, port authorities have to establish a system of governance that specifically addresses these concerns.

The implementation of PSHEMS, an integrated management system, in Bangkok and Laem Chabang Ports, Thailand, has proven to be an

effective approach in ensuring health and safety of port workers, reducing environmental impacts of port operation, and enhancing the port's business performance.

This case study discusses how PSHEMS was implemented in the ports of Bangkok and Laem Chabang, the outcomes, and the lessons learned from PSHEMS implementation.

Background

PSHEMS

The PSHEM Code (PEMSEA, 2012; Box 1) provides port authorities and operators with guidance that enables them to establish and implement PSHEMS and assess and improve their operational

Box 1. PSHEM Code.

The PSHEM Code is aimed at providing port authorities and companies operating within the port, whose activities may have an effect on the health and safety of people, environment, cargo, and port installation, with a voluntary standard against which to measure the performance of their operations with regard to quality, safety, health and the protection of the environment. The PSHEM Code is structured using the Continual Improvement Process.



procedures that are consistent with relevant and applicable international and national regulations, guidelines, and standards. The development and implementation of PSHEMS results in the improvement of the port's performance, including continual improvement of port operations with respect to safety, health, and environment protection, as well as quality and productivity performance over time. The PSHEMS further ensures compliance with mandatory national rules, regulations, and standards, as well as any applicable international conventions, codes, guidelines, recommendations, and standards, whether of international organizations or nongovernment port industry associations, where relevant and appropriate.

The essential components of PSHEMS cover the ISO 9001 standard on Quality Management Systems (QMS) and the ISO 14001 standard on Environmental Management Systems (EMS) as well as the OHSAS 18001 standard on Occupational Health and Safety Management Systems.

Bangkok Port

Bangkok Port is one of the five main ports in Thailand. It is located on the east side of the Chao Phraya River in Klong Toey District, Bangkok, and is under the jurisdiction of the Port Authority of Thailand (PAT). Bangkok Port is a river port, positioned as Thailand's second largest port with a throughput of 1.6 million twenty-foot equivalent (TEU) in 2015. It has a total land area (within the customs fence) of about 145.36 ha. Bangkok Port offers cargo services to promote and facilitate international transportation. The services of Bangkok Port include container storage and inbound cargo service, outbound container freight station service, open stuffing area, empty container yard service, reefer container service, and a coastal and barge terminal.

In March 1991, an explosion caused by an unidentified chemical occurred in the dangerous cargo warehouse of Bangkok Port. The accident caused loss of life, cargo, property, and damage to the environment. Total damage was estimated at US\$ 8 million (Poopetch, 2014). The fire started in a warehouse for hazardous substances that spread rapidly via several large explosions. The incident prompted the PAT to step up its efforts towards improving its safety, health, and environment (SHE) governance. In March 2005, PEMSEA introduced PSHEMS to the PAT, who in turn decided to implement PSHEMS in Bangkok Port. PAT recognized that PSHEMS is an integrated management system designed to provide port authorities or individual port operators with a management framework for enhancing efficiency, cost-effectiveness, and profit for their operations.

Laem Chabang Port

Laem Chabang Port is Thailand's main deep-sea port, covering an area of 1,041 ha. Located on the eastern part of Thailand, Laem Chabang Port is an international port that serves as a trade gateway for the rest of Thailand and Indochina.

Since its inaugural operation in January 1991, Laem Chabang Port has grown to become Thailand's most important seaport, servicing 70% of the country's sea transport volume (Apai and Thammapreddee, 2014). It offers universal services for the global exchange of goods, with several multipurpose terminals for containers, roll on/roll off (RO/RO), passengers, general cargo, and shipyard.

However, since the port's construction, which involved dredging, land reclamation, and construction of a breakwater, shore erosion and sedimentation have impacted on properties and users in the coastal area. It also faced a number of challenges with regard to SHE in the port. In

addition, coastal users and communities in the area raised issues such as:

- air pollution, increasing accidents, and economic losses due to trucks transiting all roads connecting to the port;
- increasing volume of solid and hazardous wastes generated by the port's operations and poor waste management practices within the port;
- the perceived high risk due to the sheer volume of inbound and outbound dangerous goods cargo being handled each year (more than one million tons); and
- concern over the potential for targeted terrorism, involving, for example, destruction of property, port disruption, and environmental damage to the area.

Following the successful application of PSHEMS in Bangkok Port, PAT implemented the same management system in Laem Chabang Port in 2008, with support from PEMSEA.

Approach and Methodology

Bangkok and Laem Chabang Ports successfully implemented PSHEMS through the following key steps:

- 1. Define scope of PSHEMS.** One of the first steps in developing PSHEMS was to define the scope of the management system. For example, the initial scope of PSHEMS development and implementation in Bangkok Port was limited to dangerous goods handling since this is one of the core processes in port operations with the highest threat on SHE. Bangkok Port also took into consideration the availability of resources, manpower and time constraints in determining the scope of PSHEMS. Later on, with the initial progress achieved in dangerous goods handling, the scope was broadened to include all other services in the organization.

The implementation of PSHEMS in Laem Chabang Port started with the management system of the port authority, focusing on port governance since it oversees the port area as well as the terminal operations conducted by private port operators.

- 2. Set up a representative PSHEMS Working Group.**

To be able to effectively control and monitor PSHEMS development and implementation activities (Box 1), Administrative Committees were established, headed by the Managing Directors of Bangkok Port and Laem Chabang Port. To support the committees, working teams composed of representatives from all concerned units in the ports were established. The working teams were subdivided into three groups: operational, equipment handling, and administrative. Each group was assigned to review specific processes in order to determine their alignment with the PSHEM Code requirements. Bangkok Port also provided a working area for PSHEMS-related activities. Apart from the working teams, internal audit teams were also established and trained. The audit team was responsible for monitoring, controlling, and improving PSHEMS.

- 3. Build capacity at all levels.** Several training were provided by PEMSEA to the personnel of Bangkok and Laem Chabang Ports to enhance their understanding on the essential elements of PSHEMS and equip them with the methodologies for the development and implementation of PSHEMS (Box 2). The first training was on Applicable International Regulations Concerning Port Operation and PSHEMS Design and Implementation. It aimed to enhance understanding on and to facilitate identification of international and national regulations relating to SHE. Subsequent workshops were conducted to guide the local teams through the different phases of PSHEMS development and implementation including the requirements for certification. In addition to increasing the awareness of the project team on relevant regulations, practical exercises

Box 2. PSHEMS development.

A series of training on PSHEMS were conducted by PEMSEA and participated in by relevant departments of the port authority and operators. The training courses included:

- **Phase 1:** Understanding PSHEMS and Initial Status Review
- **Phase 2:** PSHEMS Strategic Planning
- **Phase 3:** System Development and Documentation
- **Phase 4:** Implementing and Monitoring
- **Phase 5:** PSHEMS Internal Auditing
- **Phase 6:** Continual Improvement of PSHEMS

enhanced their auditing skills and enabled them to assess the strengths and weaknesses in port operations and to identify areas for improvement.

4. Assess compliance with existing legal obligations.

The initial status review of the port management system required the port authority or operator to assess the existing management system of the port, including its compliance with legal requirements and international practice. For example, the safe handling and transport of dangerous goods in Bangkok and Laem Chabang Ports were assessed in relation to the International Maritime Dangerous Goods Code and Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas. The specific provisions of these two international instruments were reviewed, and applicable provisions to both ports were identified. Action plans were then developed in the respective ports to address gaps in the implementation of relevant and applicable provisions of these instruments specifically those relating to SHE aspects.

5. **Identify health and safety hazards and environmental risks.** As part of the initial status review, health issues concerning employees, safety hazards, and environmental risks were identified for each process area. With the implementation of PSHEMS, the ports were able to create one system

that helped to effectively and efficiently deliver their improvement programs on employees' health, monitoring safety risks and hazards, reducing inefficiencies, and maximizing resources. It allowed the port to identify SHE risks and hazards, and implement and monitor improvement programs in a coherent manner to achieve its objectives.

6. **Document and monitor the implementation of PSHEMS.** The development of the management system and documentation of the PSHEMS manual were challenging tasks since they covered the requirements of three management systems – ISO 9001, ISO 14001, and OHSAS 18001 standards. However, even if these systems differ in their approach and degree of prescription, the three standards are compatible in content, terminology, and many of the requirements.

Results

The implementation of PSHEMS in Bangkok and Laem Chabang Ports showed significant impacts with regard to reduction of accidents in the port areas, improvements in environmental performance and increased port productivity (UWE, 2009; PAT, 2010; ASEAN-GTZ, 2011). These are demonstrated in the following examples:

Bangkok Port

Improved traffic management capability. Traffic management was considered a priority concern for the port. Its solution would greatly enhance the management of SHE concerns. With the support of the German International Cooperation (GIZ) under the Sustainable Port Development in the ASEAN Region Project, the port undertook a rapid transport assessment to study the existing traffic situation of Bangkok Port, prepared a streamlined emission inventory, and formulated a work program for the development and implementation of a Port Traffic Management (PTM) Plan at the beginning of 2011.

Short-term measures that were implemented included the introduction of traffic control policies and procedures at the gatehouse, the appointment of a PTM officer who cooperated with the Highway Authority to address offsite issues, and the introduction of a safety guidebook. Medium-term measures included the introduction of a port park and ride scheme on a voluntary basis and the establishment of key routes as clearways. Long-term measures included the study for Bangkok Port's Land Use Master Plan and the program for the increased use of rail for the movement of goods within the port area. All in all, these measures yielded significant benefits and improved the traffic management capability of Bangkok Port, resulting in faster turnaround time for equipment and the reduction of vehicle volume inside the port (ASEAN-GTZ, 2011).

Reduction of DG-related incidents. Several measures were undertaken to prevent accidents in the dangerous goods area. These included the strict regulation of access to the warehouse area by cargo trucks, which were required to park in a designated area and only enter when the dispatch process was already completed. In addition, a safety sign was posted at the entrance showing the number of accidents that occurred in the dangerous good warehouse resulting in increased awareness for safety

in handling and improved compliance with control procedures.

In terms of capacity building, the Dangerous Goods Training Course was revised based on the prescribed course developed by GIZ. In particular, a dramatic reduction in the number of incidents/accidents related to handling occurred and the zero incidents/accidents were achieved (Poopetch, 2014).

Improvements in the overall physical environment. With the implementation of PSHEMS, Bangkok Port exhibited notable improvements in its physical environment, as shown in Box 3.

Laem Chabang Port

Improved waste management regulations and procedures. In 2011, Laem Chabang Port, in cooperation with GIZ for the implementation of the Sustainable Port Development in the ASEAN Region, improved the management of waste generated on board ships and cargo residues, and avoided daily illegal operational spillages and discharges. The immediate outputs of the project were the development and implementation of the

Box 3. Bangkok Port activities.

Access area in front of the West Main.



BEFORE



AFTER

Port Regulations on Waste Management and the Port Waste Management Manual.

Reduction of greenhouse gases. In 2010, Laem Chabang Port initiated a Green Port Program to address its carbon monoxide (CO) emissions. The port decided to set up a Wind Farm Power Pilot Project to increase the proportion of green energy to the port's total electricity consumption. Eighty-four units of 18-m high wind turbines designed especially for the port were installed during the first phase of the project. The combined power generation capacity of all 84 units was around 840 kW/hr. The system is expected to generate electricity at an average of 2.5 million kW/yr, which will decrease CO emissions into the atmosphere by about 1.4 million tons per year.

Reduced carbon emissions. The new policy of Laem Chabang Port, under the Green Port Program, required that all new rubber-tired gantry (RTG) installations be electric-powered. Some private terminal operators, (e.g., LCB Container Terminal 1 Ltd.), started to modify their heavy-duty handling equipment (e.g., RTG crane) from diesel fuel to electrical power. The modification of 20 RTGs was expected to reduce CO emissions by about 1.80 tons/year.

In addition, since March 2009, Hutchison Laem Chabang Terminal Co., Ltd. installed 12 units of electric RTGs in container terminals C1 and C2. Laem Chabang Port will likewise apply more electric supply for ships berthing at the quay wall.

Natural resources conservation and preservation of mangroves. Situated in a coastal area of a Laem Chabang village, the port has a natural mangrove forest covering an area of about 4.5 ha. To preserve its diversity, Laem Chabang Port, together with Laem Chabang Municipality and Kasetsart University (Sriracha campus), entered into a Memorandum of Understanding in the latter part of 2008 to collectively undertake activities to preserve and rehabilitate the mangrove forest.

The Natural Resources Preservation Program encouraged people to participate in many activities, such as collecting garbage, surveying types and density of mangrove stands, replanting of the destroyed areas of the forest, monitoring seawater quality, etc. Moreover, academic activities conducted around the port enhanced knowledge on environment and natural resource preservation for the local communities and school and university students. The forest within the port area is used as a recreation site for the general public. The port has likewise undertaken activities related to natural resource rehabilitation, such as planting trees within and around the port.

Lessons Learned

Most of the lessons learned by the PAT with regard to the experiences of Bangkok Port and Laem Chabang Port in the development and implementation of PSHEMS are **management imperatives that can be applied in other ports and port authorities and operators** in the East Asian region.

Key lessons learned include:

- **Securing support from top management** and port authority was key to sustainability of PSHEMS. Top management provides not just resources but also the overall direction and strategy that would guide the whole organization.
- A working group and **working teams composed of representatives from all concerned units** ensured that the development and implementation of PSHEMS were relevant, well-planned, and supported across the entire operation.
- With the limited available resources at the start of the PSHEMS Project, the scope of work was **focused on a small manageable area** (e.g., the handling of dangerous cargoes in the case of Bangkok Port). This proved to be a good strategy not only in giving the port personnel experience in developing and implementing a new system cost-effectively, but also in addressing an area of the operation with greatest risk to SHE.

- Although time-consuming, **proper and adequate training** was essential in order to improve the competency of personnel tasked to develop and implement PSHEMS.
- **Internal audit and management review processes** were necessary for the system to **remain effective and be continually improved**, including adapting policies and procedures to applicable new or amended national and international regulations, and revising existing rules and regulations accordingly.
- The **exchange of knowledge and experience** in SHE with other ports, port authorities and port operators, local governments, and universities was a mutually beneficial way to improve port governance.

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ICM System Certification: a Process for Recognition, Inquiry, and Internal Dialogue

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Key Message

- An ICM System (ICMS) Certification is a governance and management performance tool, which underpins monitoring and evaluation, contributes to capacity building, and seeks accountability.
- ICMS Certification is as much an organizational work as an individual growth. As the ICMS matures, it is imperative that the competencies of ICM leaders and allied professionals continue to improve.
- ICMS Certification—beyond compelling ICM sites to follow standardized processes and procedures to gain recognition—is a strategic lever that unlocks many benefits.

Abstract

A Level 1 ICMS certification audit—based upon the requirements of the ICM Code—was pilot tested in Batangas, Philippines, in 2014. By the following year, 15 other local governments requested Level 1 ICMS certification audits. Fifteen of the 16 sites eventually received ICMS Level 1 certification. PEMSEA acted as a third-party auditor while the respective ICM site managers served as auditees. While the ICM Code was crafted to include requirements and procedures and a suite of general prescriptions in the management toolbox, the certification audit ascertains whether processes are being correctly followed and/or whether the requirements are complied with, are missing, or in some instances, if substitute proxies are appropriately suited for the ICMS.

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The conduct of an ICMS certification audit is most appropriate when the ICM system is in place and fully operational, including processes for assessing and continually improving ICMS towards sustainable development.

Among the direct benefits of adopting and implementing an ICMS, local governments experience a resultant growth in capacity and an ability to leverage accomplishments, such as stronger coalitions with partners, improved planning, and opportunities for cost-sharing and cost-effective use of available funds and resources.

Background

In 2007, PEMSEA initiated the development of an ICM Code in its efforts to develop and implement a systematic approach to integrated management of marine and coastal resources using the ICM approach (Chua, 2008). In 2015, the Code was officially recognized as an international standard which measures a local government's governance and management performance vis-à-vis its explicit—and agreed upon—integrated coastal management system (ICMS) (PEMSEA, 2015).

Developed in accordance with the ISO 9001 and ISO 14000 requirements of the international standards for quality and environmental management, the ICM Code covers planning, developing, implementing and improving an ICMS.

The Code encapsulates decades of ICM practices and experiences, particularly in the East Asian region, and has the following features:

- Provides a systematic approach to sustainable coastal development based on international standards for environmental management and quality management, at the local government level;
- Facilitates efficient and effective use of available resources through an integrated planning, implementation, monitoring and review process;
- Uses the “ICM Development and Implementation” process as the basis for continual improvement;

- Applicable to any local government that wishes to establish, maintain, improve and seek certification of their ICM System; and
- Validates the operations of a local government conforming to international management standards, i.e., ISO 9001 and ISO 14001.

Full execution of the ICM programs enables the local governments to be certified in compliance with the international standards of practice (Chua, 2008). In this case, PEMSEA has the experience in promoting the use of ISO certification in ensuring port safety, health of workers and environmental quality through port safety, health and environment management system (Cardinal and Factuar, this volume).

With the ICM Code, PEMSEA developed and implemented an ICMS Certification designed for local governments seeking validation of their ICMS and recognition for excellence and continuous improvement (Box 1).

The ICMS Certification formally evaluates and certifies that an ICMS conforms to the requirements of the ICM Code. This may be integrated with other local management requirements to enhance local governance and achieve desired social, economic and environmental goals. Three levels of certification are available (Figure 1).

Figure 1. Three levels of certification.



Box 1. ICMS certification process

To achieve certification, a local government's ICM system needs to undergo the ICM System Development, Implementation and Continual Improvement Process, which comprises four phases:

Phase 1: Initial Status Review

This first phase consists of a system review to establish the current status of the existing process and the ICM System being implemented by the local government.

Phase 2: Strategic Planning

In this phase, the scope of the ICM System is determined and the business process is established. Risk assessment is conducted and the objectives, targets and programs are then established.

Phase 3: System Development and Documentation

This phase involves the establishment of manuals and procedures to facilitate the control of the process and address identified risks.

Phase 4: Monitoring and Measurement

The policy and programs of the ICM System are implemented progressively during this phase. The planning and conduct of audits and continual improvement of the ICM System are also implemented.

Following ICM System Development, three stages of external audits are conducted as part of the ICM System Certification Process.

Stage 1 Assessment: System Adequacy Audit

The established ICM System and its documentation are assessed against the ICM Code.

Stage 2 Assessment: Effectiveness of the ICM System Implementation

Stage 3 Assessment: Continual Improvement

The ICM Code and the ICMS certification are recognized as essential components of national ICM scaling up programs in several countries as they underpin monitoring and evaluation and capacity building (Chua, 2006). By following standardized procedures and processes as defined in the ICM Code, the potential for the East Asian Seas to become a region of excellence in implementing good practice in ICM increases and could markedly influence policy reforms in the international arena.

Approach and Methodology

A Level 1 ICMS certification audit involves three stages of assessment:

Look at the system

The first stage in certification auditing is to seek evidence that an ICM system is in operation by:

examining information and materials such as official documents and resolutions, minutes of meetings, organograms, websites, databases, staff trainings, annual work plans and budgets, IEC materials, photos, and progress reports. A certification audit is carried out initially by ticking off dialogue boxes of a certification checklist, a simple yes-no response (Annex) and satisfying conformance to the ICM Code.

The exercise is marked by looking at two infrastructures: institutional (staff composition and training, planning tools) and information (meetings, workshops, consultations, progress reports, monitoring documents). This is an assets-based approach looking for the necessary resources (or assets) for mobilization in order to fulfill the ICM requirements.

This stage steers two outcomes: 1) it is a deliberate way of identifying the spectra of policy options put

into motion; the range of analytical and planning tools adopted; and the variety of interventions implemented; and 2) it provides information on the traction made to help move the process forward to establish (for new sites) and sustain (for mature sites) an ICM system.

Look for interactions/ relationships

The second stage in certification is an in-depth interview and discussion with the auditees. This stage aims at surfacing underlying interactions and relationship-building activities that contribute further to effective implementation, in general, and to good governance, in particular.

This is a functions-based approach, which is premised on two questions: 1) How did a local chief executive and an ICM manager use the components and variables of an ICM system to create a context conducive to the initiation of integrative planning and governance, a partnership approach, consensus building, and capacity building? 2) How did a local chief executive and an ICM manager navigate and adapt through the complexities of local governance (mired in institutional, sociopolitical, and ecological uncertainties and disruptions) using the components and platforms of an ICM system?

The exercise is able to articulate strategies to manage interactions (inside the organization) and building relationships (across government division and agencies and with other partners and stakeholders).

Look beyond the system

The third stage in certification is underpinned by the principle of continual improvement. It is envisioned as a way to carry out dialogue about the system: auditees are asked to examine and identify

areas for improvement of the ICMS. At the first instance, the inquiry is narrow and singly focuses on reforms in administrative procedures and capacity building. However, with knowledge gained from understanding and improving coastal and ocean governance, this stage is also a reflection on several fundamental questions to advance the maturity of ICMS towards sustainable development:

- What scenarios in the future can be forecasted given present conditions? How can an ICMS contribute further to what and where governments want in the future?
- What actions are feasible now and what steps are needed to address more fundamental problems over the longer term? What policy and institutional reforms are needed to further improve governance? Are the present plurality of “legal hierarchy” and implementation spaces (including ICMS partnership networks) appropriate for an anticipated future development?
- What mechanisms of local government readily allow an ICMS to accommodate nascent and emerging dilemmas and what systemic concerns need national (and even international) attention to be taken on as opportunities? How can an ICMS influence reframing and re-alignment of priorities?

Results

Conformance to the ICM System

Table 1 shows the list of ICM sites recognized by PEMSEA with Level 1 certification. These ICM sites were separately audited in 2014 and 2015 and were individually recognized during the East Asian Seas Congress, in Da Nang Viet Nam, in 2015.

Table 1. Level 1 ICMS certification.

Country	ICM site	Year ICM was established	Date of ICMS Level 1 audit
Cambodia	Preah Sihanouk	2000	25 September 2015
China	Dongying	2005	26 October 2015
	Fangchenggang	2005	27 October 2015
	Haikou	2005	27 October 2015
	Lianyungang	2005	26 October 2015
	Quanzhou	2005	26 October 2015
	Xiamen	1993	27 October 2015
Philippines	Batangas	1993	26-27 August 2014
	Bataan	2000	16-17 April 2015
	Cavite	2004	22-23 April 2015
	Guimaras	2008	5-8 May 2015
Thailand	Chonburi	2001	20 October 2015
Viet Nam	Da Nang	2000	13 July 2015
	Quang Nam	2004	14 July 2015
	Thua Thien Hue	2007	14 July 2015

Obviously, local governments that have long been implementing their ICM programs complied with the ICM Code and Level 1 requirements. All of them demonstrated an ICMS that was initially targeted as project-based but eventually became integrated into the general function of the local government. Thus the components for seamless planning and implementation processes were set up, became operational and/or were adopted, including a Project Management Office (PMO), an interagency coordinating mechanism, the delineation of a management boundary, the baseline state of the coast report or profile, a coastal strategy, an annual work plan and budget, and a monitoring and reporting mechanism. Institutionalized, each component was deliberately and explicitly aligned with the general development policy and administration of each local government, which meant that the ICM

system was embedded in the day-to-day planning and administrative processes and procedures of the local government.

While the ICM Code was crafted to include requirements and procedures and a suite of general prescriptions in the management toolbox, the certification audit ascertains whether processes are correctly followed and/or the requirements are complied with, missing or, in some instances, whether substitute proxies are appropriately suited for the ICMS. In some audits, requirements initially appeared to be missing or nonconforming. But the certification audit process allowed the examination of other strategies or proxies that can take the place of the prescribed elements and processes that validated the conformance of the ICM system with the ICM Code.

One of the more typical problems encountered during audit is the infrequent and irregular convening of the interagency coordinating mechanism. In Batangas, Philippines, two strategies were carried out to maintain and sustain the coordination. Regular meetings of the ICM focal persons were held to discuss issues and matters related to ICM program implementation in lieu of the convening of the full Batangas Environmental Protection Council (BEPC). ICM focal persons were designated by the Mayors through Executive Orders or similar Administrative Orders. The focal persons were in turn responsible for discussing the concerns of the ICM program with their respective Mayors. Another strategy was convening of meetings of the BEPC as part of a bigger event organized by the province, e.g., the Batangas Environment Summits, first held in 2011.

In PR China, coordinating mechanisms may be hard to convene when immediate responses are needed to allay concerns about emerging issues and emergencies. Dongying created ad hoc subcommittees that were required to meet two to three times within a year to address problems needing immediate actions. In Haikou, the Deputy Party Secretary and the Deputy Mayor each leads a coordinating mechanism related to the operation of an ICM system. Regular, almost weekly meetings are held with the executives. But in response to emerging issues and problems, ad hoc subcommittees are easily assigned (and mobilized) among the members of the coordinating mechanisms.

Communication plans are non-existent in most sites. However, consultative meetings and workshops, which are well-embedded in the planning and policymaking processes, and regular information, education and communication (IEC) activities, which are differently employed during the implementation processes, are in place. In Lianyungang, PR China, during the planning phases, the Lianyungang ICM Leading Group's rules of procedure and a cooperation framework agreement became operational, which resulted in a

full consultation with relevant agencies and sectors involved. During implementation phases, public awareness strategies included active participation during festivals and regular announcements and notices of work activities, regulations and accomplishments.

In Fangchenggang, PR China, the communication channels operating during the planning phases involved full consultation with relevant government agencies and sectors, which are members of the coordinating mechanism. Agencies were normally requested to provide comments and reviews. Data and information were readily shared among member government agencies. The staff of Fangchenggang Oceans and Fisheries Bureau (FOFB) were assigned to gather stored data located in other agencies. During the implementation phases, stakeholders were informed through different strategies, including: (1) FOFB conducted regular water quality monitoring and shared the data with other government agencies. FOFB produced yearly water quality results (and other environmental conditions). These results were seen on television and newspapers; and (2) the FOFB website was used for raising awareness through announcements of activities and accomplishments. It also carried hotline numbers dedicated for queries and complaints

In Quanzhou, PR China, during the planning process, the subcommittee meetings were used as platforms to solicit dialogues; and during implementation phases, the Quanzhou Oceans and Fisheries Bureau (QOFB) facilitated smooth coordination and effective communication between agencies with mutual agreements, particularly in marine law enforcement and marine environmental protection. Several IEC strategies were used and integrated in the annual work plan with budget. Stakeholders were informed through strategies that relied heavily on mass media to target the general public, as well as particular stakeholders. For awareness building, announcements from QOFB regarding results of activities were disseminated in newspapers, television and the QOFB website;

and an Ocean Library was set up in selected public schools to raise awareness about caring for the oceans.

Audit is also a mechanism to compel a site to address a nonconformance, within a deadline, as requisite to being certified. For instance, Cavite was able to refine the Cavite Sustainable Development Strategy and complete the Cavite SOC for the Level 1 certification.

ICMS certification audits prepare sites which commit to ISO certification and reinforce the procedures of existing ISO-certified sites (e.g., Xiamen and Cavite) as well as in tandem with existing national or local performance audits. In Bataan, ICMS is integrated with the requirements of another management system to enhance local governance and achieve desired social, economic, and environmental goals. In this case, the ICM System, together with the Performance Governance System (PGS), is under the Special Projects Division of the Bataan Provincial Planning Office. PGS, which complements ICMS, is a transformation tool of the local government performance.

Proper implementation and maintenance of the ICM system

PMO as a lever. The audits confirm the critical role played by the PMO. PMOs can be considered as the workhorse—the heart, even—of a functioning ICMS. It is the main hub for coordination and integration and could harmonize a local government's operations. At the forefront of the day-to-day operations, and the “gatekeeper” of the proper implementation and maintenance of the ICMS, the designated PMO head and deputies (usually from an environment, ocean and fisheries, or planning division) are the default managers of the ICMS.

The common narrative that was reinforced during the audits was the transformation each manager underwent to becoming better at what they do over years of implementing ICMS. With a direct line to a

local chief executive, managers became more facilitative; given constant conflicts to resolve, skills in political brokerage, relationship building, and collaboration with different sectors and partners improved; with a limited staff to manage huge responsibilities, administrative skills were bolstered; given new knowledge acquired through training and collaboration with different partners, a new way of looking at different perspectives and reframing issues in the coastal areas became second nature.

A new set of skills, competencies, and values were ingrained; ingredients to being better managers and leaders. Implementing ICMS is contributing to unfolding the criteria in leadership development to create new “breeds” of effective sustainability leaders:

- In Cavite, the ICM program manager has excellent grasp and understanding of the ICM principles and approaches and was thus able to see the different entry points of ICM program implementation in the government's policy cycle. Recently chosen as a scholar to complete a Professional Masters in Tropical Marine Ecosystem Management, the manager embodies the ICM tenet of “good science-good governance” dichotomy;
- In Batangas, the manager has shown special aptitude in strategic governance and as a policy entrepreneur: knowing which partner to collaborate with given specific circumstance has become second nature; and advocating the importance the SDCA framework and using it as a decision tool whenever new funding partners offer new projects to the province;
- In Guimaras, good and effective leadership by the PMO head was evidenced: instituted hands on and effective delegation of tasks; exhibited fairness in assigning which staff will further undergo training and capacity development; has foresight and spearheaded the re-structuring of the Guimaras Environment and Natural Resources Office;
- In Fangchenggang, an introspective and reflective manager realized the significant contribution of ICM in conflict resolution, particularly between

port (shipping), fisheries and tourism activities; strengthened awareness in the protection of mangroves (about 21% of Fangchenggang's coastline is zoned for mangrove protection, the largest in China); expressed the differences in the level of capacities and skills of the staff and the problem of high turnover rate of staff, thus the urgency for upgrading capacity of staff and need to train new ones;

- In Dongying, the manager exhibited excellent collaboration and networking skills and fully utilized the wealth of resources offered by the State Oceanic Administration and the China-PEMSEA Center, which catapulted Dongying as the model in the implementation of an ICMS being replicated by the other ICM parallel sites in PR China;
- In Preah Sihanouk, a junior manager playing adaptive and strategic roles realized and remarked: "We had four governors since we implemented ICM. This means four different styles of leadership and ICM has helped us work well with our leaders. I think that is one good result of capacity building: being able to adapt to different management styles;" and
- In Da Nang, one of the junior managers exhibited self-awareness as requisite to growth in any professional career, and remarked, "Implementing an ICM program made me understand the benefits of integrated management approach to achieve sustainable development, which is very useful for me to carry out various tasks related to the management of the environment and natural resources. My involvement in ICM project implementation has taught me how to develop and manage projects and plans as well as collecting and sharing data and information with various stakeholders. The project has also provided me the opportunity to improve my ability in preparing and presenting reports."

Trust is a must. The audits also confirm, that in building relationships, partnership networks must endure the processes of engaging and convening

stakeholders and partners in a variety of ways and multiple times. Buying-in to the ICMS processes and the conferment of legitimacy to adopted actions are common outcomes as evidenced in the adoption of coastal strategies, in the implementation of plans and targets; and in validating results from the State of the Coasts reporting. But more importantly, accountability and trust were built, validating most experts' view that (e.g., [Jentoft, 2007](#); [Verutes, et al., 2017](#)): "Trust is built through repeated interactions".

With a constraint due to limited numbers of staff and resources, public and partnership engagement are key in implementing interventions. PMOs were again at the forefront of this strategy: coordinating, mobilizing volunteers, and "dipping" and partaking into the resources of a network of partners. PMOs articulated ease in coordination, over time, with other government agencies. Reinforcing civic duties and volunteerism were the other outcomes: it could be "forced" (as exhibited in centralized states like PR China and Viet Nam, characterized by large numbers of volunteers that can be mobilized immediately) or "goaded with incentives", in the form of free food, clothing and transportation (as in democratic states of Indonesia, Thailand, and the Philippines); the other good outcomes guised as a monitoring strategy to show increased awareness and knowledge about taking care of the environment; even gaining public relations brownie points for the local government (points that could be translated to votes for local officials) and as corporate social responsibility points for the private sector partners.

The audit of Quanzhou revealed exemplary accomplishments: several ICM projects were demonstrating technologies and approaches which were creating positive results. The Quanzhou coastal water quality was improving: 84.6% of the coastal monitoring stations reached the standard in 2014, compared with 50% in 2006. The investments in the special coastal zone north of Quanzhou Bay, the coastal zone from Chongwu to Xiutu, resulted in not only 10 large coastal zone management and restoration projects being accomplished but

also significantly raised public awareness in coastal resources conservation and rehabilitation.

Aside from the relevant government agencies in Quanzhou, other sectors which have been gradually included and have been consulted during policy discussions—and have been demonstrating strong support for ICM activities, in recent years—included private companies from port and shipping industries; and fishers and farmers. This recent development bodes well for Quanzhou's long coastline, which offers both high opportunity for investments and economic growth and a platform in demonstrating effective coastal resources protection and restoration through partnerships with various sectors.

All auditees remarked that while public awareness building is incorporated in the annual work plan and budget, new strategies are needed to be explored to promote greater public participation.

Identifying areas for immediate ICMS improvement

Four priority activities were repeatedly mentioned across all sites that the auditees felt merit immediate attention.

Revitalizing the coordinating councils. The local chief executive on top of the organogram has a huge symbolic meaning: it defines commitment and for the most part, accountability: where the buck stops. Most sites were saddled with the challenge of convening the councils regularly and more frequently, which diminished some of their oversight role. The auditees expressed the value of convening as one group, which can further strengthen policy and decisionmaking; and they committed to explore other strategies to meeting this requirement. With initiatives to scale up ICMS, the councils were taken to task in the engagement of other groups (e.g., women, youth, marginalized poor)—to become more inclusive—and in sustaining the commitment of usual partners and sectors (e.g., NGOs, academic, and private).

Staff training. The value of upgrading skills was not lost among the auditees. The drivers were three pronged: emerging challenges (e.g., climate change

and disaster risk reduction); amassing huge data; and high turnover rate of staff. The manager of Fangchenggang, in particular—who had been doing ICM-related and ICM programs since 1997—realized the institutional memory for ICM can be considered low given the high turnover rate of staff. In Quanzhou, the manager expressed the need for practical management skills, including leadership training.

In most ICM sites, the reality is that the present crop of dedicated managers is reaching retirement age. There is constant need to train new staff to become the next ICM leaders. As a first step, the auditees committed to conscious and regular tracking of staff development through a matrix of training as a record of the training attended and of potential skills needed for capacity development: a practical way to identify capacity building needs and gaps.

Information management. The auditees agreed that because data are continuously being collected and used to update the State of the Coasts (SOC) report, there is a need to establish an integrated information management system (IIMS) ([Padayao, this volume](#)). In PR China, the sites update the SOC every five years and committed to establish IIMS as an essential improvement to their ICMS. The State Oceanic Administration in turn offered to provide technical guidance and support. In Viet Nam, the development of the IIMS is in coordination with Viet Nam Administration for Seas and Islands, Center for Planning and ICM. Starting in Thua Thien Hue Province, the People's Committee decided to establish the IIMS so that data can be used in the development of its SOC. The development of the IIMS will eventually look into the consolidation of information from local to the provincial level.

Documentation. The auditees agreed that documenting good practices (through case studies and enhanced monitoring reports) is not just documenting accomplishment but a sharing of knowledge so that local governments can learn from the experiences of each other. In Lianyungang,

PR China, the three new ICM projects are demonstrating technologies and approaches which are aimed at becoming a national model: marine ecological compensation project; oceanic pasture (Ocean Park) project; and the special marine protected area project.

In Dongying, PR China, several new ICM projects are demonstrating technologies and approaches, which are creating positive results: the establishment of special marine protected areas; the private sector is influencing how the concept of the payment for ecological services is being used in a realistic and practical way; and an eco-aquaculture project is demonstrating low density abalone farming, control of antibiotics use, and utility of geothermal energy to power installations.

There was also an impetus to document the processes and procedures applied in the implementation of the ICM system in each site and in preparation for the sites that expressed intention to undergo the ICMS Certification Level II.

Measures for continual improvement to advance the maturity of ICMS towards sustainable development

Although great strides to sustainable coastal development have been taken, the auditees realized that the journey is a long haul one. The certification audit processes have compelled managers to look beyond what is current. It became a process of inquiry and contemplation on what issues need attention and how the current governance and management systems, including ICMS, will be up to the task given emerging environmental dilemma, efforts to comply with international targets including the Sustainable Development Goals, and initiatives looking at effective scaling up mechanisms.

The landscapes to where the sites would want to be in the future are vested on policy and institutional reforms, looking at new technological interventions and expressing need for national government

support. Such forward looking approaches, based on the issues and concerns as discerned by managers from the ICM sites in PR China, are described below:

- In Quanzhou, owing to the long coastline being governed, two functional coordinating mechanisms were established. One has an administrative jurisdiction over the entire coastline and the other dedicated to the special coastal zone north of Quanzhou Bay, covering the coastal zone from Chongwu to Xiutu earmarked for coastal protection and restoration. The manager expressed the need for further support from the government for more strategic planning as well as support from research and academic institutions to initiate scientific based planning;
- In Dongying, the published reports about the Guangli River Watershed and the Dongying ICMS implementation became an impetus to strengthen focus on the integration of the river-coastal area-ocean continuum. A greater effort to manage ocean pollution coming from land and upstream was earmarked as a future undertaking;
- In Xiamen, the recent SOC results revealed priority areas that need more attention for the emerging opportunities in integrated coastal management and improvement in ICMS such as beach restoration; standardized sea use system, with the inclusion of new areas for specific allowable development activities; and ecotourism;
- In Fangchenggang, the concern with the use of the beach as public space was raised during the audit. Current observations showed increasing conflict between the agriculture and tourism sectors; and
- In Haikou, the manager underscored the need to scale up the implementation of ICM to the

entire Hainan Island. This could start with Sanya as local executives have shown keen interest to replicate the Haikou experience

Lessons Learned

Where you start has a lot to do with where you end up

The certification process contributed to compelling local governments to apply the ICMS, while underpinning monitoring and evaluation, capacity building, and accountability. The ICMS is comprised of fundamental requirements employed in a cyclical, long-term system. More importantly, it is a governance and management performance tool, that facilitates: monitoring and assessment of benefits and costs (or even harm) accruing with each action (or inaction) on identified issues; increased awareness on ecosystem carrying capacity; and improved strategic governance and adaptive management.

The third-party audit carried out by PEMSEA ensures an objective and credible assessment. The sites have experienced that beyond the adoption and implementation of the required elements is a resultant growth in capacity and the ability to leverage accomplishments to develop a stronger coalition of partners and to create cost-effective mechanisms. As evidenced, a competitive advantage was shown when partnering with risk averse businesses (e.g., in Xiamen, Dongying and Quanzhou, PR China) and funders (e.g., Batangas, Philippines). An ICMS and a certification are “badges” that good practices are applied and are assurances to businesses and investors of proper governance, and therefore of reduced risk. The lessons learned have prodded two countries to escalate the local experiences to national actions:

- In PR China, development of an ICM certification standard in line with PEMSEA’s ICM Code and Certification system as a

voluntary mechanism for the 52 coastal cities and provinces was subscribed to ensure sustainable development of coastal areas and the implementation of good governance practices in managing these areas. The issuance of a SOA administrative guidelines is anticipated to facilitate the process; and

- In the Philippines, ICM status review of the 228 (out of 832) coastal municipalities with ICM plans, as reported by the Department of Environment and Natural Resources (DENR) in May 2015, will be conducted using the PEMSEA ICM Code.

This is as much as an organizational work as an individual growth

A proper and functional ICMS cannot be established without the requisite human resources. It needs leaders to navigate and steer the system to what the organization wants to accomplish and to where local government wants to be in the future. It needs leaders who are dedicated and keen to gain knowledge aimed at understanding as well as improving governance (Boiral, 2007; Christmann, 2004; Christmann and Taylor, 2006; Jentoft, 2007). It is best to heed what other experts have concluded: “...debates on the efficacy of management systems, such as ISO 14001 standard might be enhanced by taking into account the action logics underlying the implementation of this type of system. Indeed, improvements attributable to ISO 14001 may depend less on the fact of being certified and more on the way in which the standard is implemented (Boiral, et al., 2009).”

The audits of the local governments were instrumental in recognizing outstanding managers of the ICMS. As such, PEMSEA believes that it is the opportune time to roll out the mechanism for the certification of ICM managers. The Annex lists the proposed requirements for a Level 1 ICMS Managers (right column) that must be demonstrated as it mirrors the Level 1 ICMS

checklist (left column). As the ICMS matures, it is imperative that the competencies of ICM leaders and allied professionals be certified based on the three ICMS levels.

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Annex

The ICMS Level 1 audit checklist vis-à-vis a proposed Level 1 ICMS manager certification audit checklist.

ICMS certification	ICMS Manager certification
ICM Governance Indicators	
1. ICM coordinating mechanism established and meeting regularly	
<ul style="list-style-type: none"> • Is there a coordinating mechanism for ICM? • Is there representation from government and sectoral interests? • Does it involve a senior political level? • Does the coordinating mechanism meet on a regular basis? • Are there minutes/proceedings of the meetings available? 	<p>Does the applicant have the ability to:</p> <ul style="list-style-type: none"> • facilitate the establishment of a coordinating mechanism for ICM? • interact with senior political level and representation from government and sectoral interests? • coordinate the regular meeting of the coordinating mechanism? • ensure the availability of minutes/proceedings of the coordinating mechanism meetings?
2. ICM Coordinating Office ICM office established and operational	
<ul style="list-style-type: none"> • Has an ICM office been established locally, which serves to coordinate multi-sectoral activities related to ICM planning, development and implementation? • Are staff hired/assigned to the office? • Has the staff been trained in ICM? • Does the ICM office prepare an annual work plan and budget for ICM development and implementation? (If the answer is yes, proceed to Section 3. If the answer is no, proceed to Section 4) 	<p>Does the applicant have the ability to:</p> <ul style="list-style-type: none"> • maintain the established coordinating office, which serves to coordinate multi-sectoral activities related to ICM planning, development and implementation? • facilitate the hiring/assigning of staff to the ICM Coordinating Office? • facilitate the training of the staff in ICM? prepare an annual work plan and budget for ICM development and implementation?
3. Work Plan, Budget and Financing Annual work plan prepared/budget allocated	
Does the local government approve an annual work plan and budget for ICM development and implementation?	<p>Does the applicant have the ability to:</p> <p>facilitate/coordinate the activities of the local government for the approval of an annual work plan and budget for ICM development and implementation?</p>
4. State of Coasts (SOC) SOC baseline/coastal profile prepared	
<ul style="list-style-type: none"> • Is the SOC baseline/coastal profile completed, including existing social, economic and ecological conditions in the ICM site? • Was the information in the SOC baseline used in identifying priority issues and areas of high risk? • Did the process for preparing the SOC baseline involve the stakeholders from the major concerned sectors? 	<p>Does the applicant have the ability to:</p> <ul style="list-style-type: none"> • facilitate/coordinate the completion of the SOC baseline/coastal profile, including existing social, economic and ecological conditions in the ICM site? • use the information in the SOC baseline in identifying priority issues and areas of high risk? • coordinate the involvement of stakeholders from the major concerned sectors in preparing the SOC baseline?

ICMS certification	ICMS Manager certification
5. Stakeholder Participation Stakeholder identification and consultation	
<ul style="list-style-type: none"> • Are multi-sectoral stakeholders informed, consulted and participating in the planning and development of the ICM program? • Are stakeholders from different sectors participating in the coordinating mechanism? • Has a communication plan been prepared for building awareness and understanding of the ICM program among different sectors? 	<p>Does the applicant have the ability to:</p> <ul style="list-style-type: none"> • ensure that multi-sectoral stakeholders are informed, consulted and participating in the planning and development of the ICM program? • facilitate the participation of stakeholders from different sectors in the coordinating mechanism? • facilitate the preparation and implementation of a communication plan for building awareness and understanding of the ICM program among different sectors?
6. Coastal Strategy Coastal strategy prepared	
<ul style="list-style-type: none"> • Has a coastal strategy been prepared, which provides the vision and strategic directions for coastal area development and management? • Has a multi-year coastal strategy implementation plan (CSIP) or similar plan been completed to delineate the specific activities to achieve the priority objectives and targets of the coastal strategy? • Were the strategy and CSIP prepared through a multi-sectoral participatory process? 	<p>Does the applicant have the ability to:</p> <ul style="list-style-type: none"> • coordinate the preparation of the coastal strategy, which provides the vision and strategic directions for coastal area development and management? • facilitate the completion of a multi-year coastal strategy implementation plan (CSIP) or similar plan to delineate the specific activities to achieve the priority objectives and targets of the coastal strategy? • coordinate the preparation of the strategy and CSIP through a multi-sectoral participatory process?
7. Sustainable Development Aspects At least two (2) sustainable development aspects planned and initiated	
<ul style="list-style-type: none"> • Are management plans completed, which address at least two of the five sustainable development aspects? • Are trained personnel allocated for the implementation of management plans? • Has an annual budget been allocated for the implementation of each plan? • Have activities been initiated for the implementation of the management plans? 	<p>Does the applicant have the ability to:</p> <ul style="list-style-type: none"> • ensure completion of the management plans which address sustainable development aspects? • facilitate the training of personnel allocated for the implementation of management plans? • coordinate the allocation of an annual budget for the implementation of each plan? • initiate the activities for the implementation of the management plans?

Integrated Urban Coastal Management: the Singapore Model

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Key Message

- The integrated coastal management (ICM) system is fully relevant to a highly urbanized coastal city that had all along been developed through sectoral management.
- The ICM system was adopted by Singapore in recognition of its usefulness in enhancing management efficiency and effectiveness of the coastal city-state towards achieving the goals of sustainable development.

Abstract

Singapore's rapid economic growth and development transformed the small island nation from a quiet tropical outpost in the early 1800s to the bustling modern cosmopolitan city that it is today. The use of its limited sea space is intense with increased competing needs. Governance of the coastal area traditionally followed a sectoral management approach with the

stronger agencies having a larger influence compared to the rest. While this kind of management contributed to stronger economic growth, the conservation of coastal natural habitats and marine biodiversity received low priority. However, effective pollution controls on land and sea prevented marine water quality from unhealthy deterioration.

From the mid-1990s, greater attention was given to the management of coastal natural habitats and biodiversity conservation. In 2009, Singapore adopted an Integrated Urban Coastal Management (IUCM) strategy, recognizing that integrated management of the coastal area is more effective at balancing competing needs and more efficient at harnessing the whole of government resources and collaborative action for addressing new issues that are relevant to the nation's long-term sustainability. This case study examines the relevance of ICM in a highly urbanized island nation that is now focused on sustainable development.

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Background

The island nation of Singapore, made up of a main diamond-shaped island and over 50 mostly small offshore islands is limited in its size, both land and sea. Although land reclamation has increased its total land area by almost 24% (from 581.5 km² before 1960 to 719.1 km² in 2015), it can only be done within the restricted territorial sea space of about 740 km², most of which are within port limits. The entire country is considered to be coastal because of the comparatively short distance of 13 km from the middle of the main island to the north or south coast. It supports a high population density of 7,697 persons/km² (2015 population was 5.53 million). Economic growth has been phenomenal with gross domestic product per capita rising from US\$428 in 1960 to \$56,284 in 2014 (DOS, n.d.).

Situated within the major shipping trade routes, Singapore's confined harbor supports one of the world's busiest ports. According to the Maritime and Port Authority (<http://www.mpa.gov.sg/>), a ship leaves the port every two to three minutes; 60,000 containers are loaded or unloaded every day; and the port itself is a focal hub of 600 ports from 120 different countries.

The coastal area is intensively developed to support the maritime sector as this has and still is contributing significantly to the nation's economic growth. The sea space is heavily utilized for shipping and as most of the territorial sea is under port jurisdiction, the Maritime and Port Authority (MPA) effectively manages the entire sea area to ensure safe shipping. Other activities include the marine industry (ship and oil rig building and repair); petroleum industry (refining, storage, trans-shipment); and power generation, aquaculture, housing, and recreation (Chia, et al., 1988). Almost all of the country's entire natural coastline has been altered and replaced by coastal reclamation and seawall construction, eliminating original coastal habitats and biodiversity (Chou, 2011).

These swift changes, accelerating over the last half-century, have radically affected both land and sea use patterns. For one, almost all of Singapore's coastal area has been modified and developed, and is now dominated by infrastructure representative of an urban city state catering to diverse maritime activities, together with oil refining and petrochemical industries located among some of the many offshore islands. Undoubtedly, the coastal environment supports maritime activities that have contributed immensely to the country's economic growth. Singapore's port is among the busiest in the world.

The legacy of sectoral management left Singapore with a coastal environment that was drastically physically modified to favor economic development. Shipping and marine-related industries dominated the seascape, while other sectors like aquaculture and recreation in restricted locations were left with little scope for expansion. Natural resource conservation and protection received, at most, scant attention from development agencies reluctant to commit to protecting coastal habitats that were within their areas of operation. Sectoral management also failed to address the increasing sedimentation of the sea. However, marine pollution control was successful, and marine water quality was adequately managed with the National Environment Agency (NEA) taking responsibility for land-based discharge and the MPA for sea-based sources.

In the mid-1990s, management attitudes widened to include marine habitat protection, a highly critical principle. The use of sediment screens to prevent damage of coral reefs and replanting of mangroves to compensate for those lost from the development of the country's first offshore sanitary landfill marked the first instance of positive protection of habitats from development impacts. All marine development projects since then have taken effective steps to minimize damage

to natural habitats, implement necessary restoration, and put in place a real-time Environmental Monitoring and Management Programme throughout and beyond the project's implementation. In 2006, the National Biodiversity Centre was established under the National Parks Board (NParks) with a mandate that included the conservation of both terrestrial and marine biodiversity.

These were the conditions prior to the adoption of IUCM in 2009. Management was clearly sectoral with stakeholder influence linked to a sector's contribution to economic growth. As the shipping sector played an active role in the development of Singapore's economy, the MPA exerted a huge influence in managing the sea, most of which was within port limits. Other sectors like aquaculture and fisheries were restricted and confined. Commercial fisheries did not exist in Singapore's seas. Natural habitats and biodiversity were neglected until the mid-1990s when preventive measures against development impact were instituted. While the marine sedimentation problem fell through the cracks between agency jurisdictions, chemical pollution was effectively managed.

The term "IUCM" takes into account the highly urbanized setting of the country with its well-developed infrastructure and the port's bustling nature. At such an advanced stage of the country's development under a mostly sectoral management regime, the question was whether the ICM (or IUCM) system was applicable and relevant, and if so, what could it achieve?

After all, Singapore's coastal area development had worked well under sectoral management with its semblance of a functional zonation concept that allowed it to develop into one of the world's busiest ports and yet maintain acceptable marine environment quality.

Approach and Methodology

In 2008, the government established the Inter-Ministerial Committee on Sustainable Development (IMCSD) "to formulate a national strategy for Singapore's sustainable development in the context of emerging domestic and global challenges." In the following year, "The Sustainable Development Blueprint" was presented, which identified key targets and initiatives to "improve resource efficiency and enhance Singapore's urban environment for the next 10 to 20 years." Next, a Sustainable Development Policy Group (SDPG) was established to oversee and monitor implementation and progress towards the blueprint targets. Within this framework, an interagency Technical Committee on the Coastal and Marine Environment (TCCME), co-chaired by NParks and NEA, was established to focus on the coastal area. Representatives of ministries and agencies dealing with pollution control, shipping, food security, conservation, and coastal protection as well as academic institutions sat in the committee (Box 1). Its role was to provide technical advice to the Coastal and Marine Environment Policy Committee, an interministerial group that provided "coordinated, holistic and strategic policy direction for CME-related issues" (TCCME, 2013).

Box 1. Agencies represented in the TCCME.

Agri-Food and Veterinary Authority of Singapore
Building and Construction Authority
Maritime and Port Authority of Singapore
Ministry of the Environment and Water Resources
Ministry of Foreign Affairs

Ministry of Transport
National Environment Agency
National Parks Board
National University of Singapore
Public Utilities Board

This paved the way for a formal integrated framework on coastal management. Organized by NParks, an interagency workshop on ICM in 2009 introduced the concepts and principles to government agencies and involved them in planning the ICM implementation. With their input, an ICM Strategy and Implementation Plan, which charted the course of the framework, was developed.

The ICM system was accepted by stakeholder agencies following the reported success and efficacy of coastal and marine management in the PEMSEA demonstration sites within the region. This was in direct response to the need for more effective management of the multiple uses of Singapore's restricted coastal area and the threat to its marine biodiversity. The experience of the demonstration sites indicated that while sectoral management allowed line agencies to manage specific issues often successfully, the important aspect of coordination and integration of the various action plans to reduce conflicts within a defined area was certainly lacking.

Results

In recognition of the need to enhance the management of the coastal area, Singapore adopted the IUCM strategy in 2009, which took into account the very advanced stage of urbanization. It closely collaborated with PEMSEA to develop IUCM for sustainable development of an urbanized coastal area. This framework aimed to enhance active partnerships and synergies among stakeholders and was meant to address the complex nature of coastal management issues in an urban environment. The formalization of the coordinating committee (TCCME) and the adoption of IUCM were meant to facilitate management that took into account emerging issues such as climate change and blue economy development, and that was more responsive to international commitments, primarily the goals of sustainable development.

The acceptance and adoption of IUCM was a mainly top-down process, but public awareness (focusing mostly on habitat loss and water quality) raised by civil action groups and activists contributed to ready acceptance by the public. No segment of society depended on coastal/marine resources for subsistence or well-being, but the general public was openly receptive to improving environmental quality and nature.

Global issues such as climate change, biodiversity loss, and energy sustainability provided the impetus for the government to focus on sustainability. In establishing the Inter-Ministerial Committee on Sustainable Development, the government recognized the importance of integrated management that leveraged on cross-agency collaboration. The committee itself was co-chaired by two ministries (Ministry of Environment and Water Resources and Ministry of National Development) with members representing the Ministries of Finance, Transport, and Trade and Industry.

Can an integrated management framework work in an urbanized coastal city that until now has been planned and developed under a sectoral management regime? The focus on sustainable development with the establishment of the IMCSD and formalization of SDPG paved the way for stronger interagency cooperation and coordination of efforts towards a shared purpose. The adoption of elements of an integrated management approach for the cleaning and restoration of the Singapore River and Kallang Basin watershed in the past demonstrated very clearly how it effectively contributed to the project's success at a time when management agencies had all along worked within isolated sectoral boundaries (Chou, 1998; Box 2).

Box 2. Cleaning up the Singapore River through integrated management approach.

The ten-year project began in 1977 when then Prime Minister Lee Kuan Yew announced the intention to keep all streams and rivers clean and free from unnecessary pollution as a way of life (Lee, 2006). He identified the Ministry of the Environment as the lead agency and specified a ten-year time span for Singapore to achieve the vision of being able to fish in these water courses by then. The project required the participation of many agencies from various ministries in a coordinated effort to effect the change, transforming these grossly polluted biologically dead zones that were treated as an open sewer and garbage disposal dump into a clean, aesthetically pleasing, and ecologically vibrant habitat (Figures 1 and 2; Chou, 1998).



Figure 1. Singapore River before the cleanup.
(Source: Italian Association of Singapore)

The project was indeed a great challenge, considering that these aquatic bodies accounted for a watershed as large as 20% of the main island with divergent issues including resettlement of people, rezoning and relocation of activities, effective management of pollution sources, infrastructure investment, public education, and implementation of new and relevant policies. The success of this project can be attributed to the adoption of the integrated management framework in as far as interagency coordination was concerned. The experience has been applied to the restoration of other water courses throughout the country. The project was motivated by strong political will. However, ICM was not institutionalized until 2009 when it was felt that a holistic management framework was essential for accomplishing sustainable development goals.



Figure 2. Singapore River after the cleanup.

Benefits of IUCM and Lessons Learned

Although the entire city state is considered coastal, the institutional arrangement most relevant to the coast and sea at the present time is the TCCME operating within the concept of sustainable development under the SDPG. High priority is placed on the impact of climate change on the country's sustainability with coastal vulnerability receiving much attention. Such emerging issues can

be more efficiently addressed by an ICM system (IUCM in this case), as more agencies secure greater appreciation and deeper understanding of the implications and agree on the best and most relevant responses.

It can be argued that Singapore's coastal area has in the past been managed adequately and has been successful under sectoral administration. Seawater quality and pollution levels have been effectively managed, and functional zonation of activities were based on a long-range concept plan that is

periodically reviewed. This, however, did not mean that conflicts and issues were nonexistent. Chia (1992) suggested that conflicts in coastal resources use were due to rapid rate of change and insufficient response to solving problems generated. The root cause was identified as the unisectoral approach of development agencies, as well as their overlapping responsibilities in managing coastal resources and space within their jurisdiction. As a result, natural habitat loss and degradation, and high sedimentation remained neglected problems, while strong pollution management did contribute to slowing habitat degradation prior to IUCM adoption.

The TCCME, in its eight years of existence, created a platform for the relevant agencies to acquire a better understanding of what is necessary to make the coastal environment more sustainable.

It paved the way for a more coordinated approach in considering management and research gaps that will result in better rationalization of coastal use and planning. An example of a more holistic outlook arising from IUCM is the declaration of Singapore's first marine park in 2014 (Straits Times, 2014). The strength of coordination and integration in the management of the watershed was clearly demonstrated in the successful cleanup of Singapore River and Kallang Basin. Once restored, they could be converted into freshwater reservoirs and enhance the country's self-reliance on freshwater. Many rivers have also been dammed and converted to freshwater impoundments.

The adoption of IUCM (or ICM system) was facilitated top-down with the opportunity introduced by the government to focus on sustainable development. While TCCME comprises government agency and academic representatives, channels are open for the public to provide their input. There are no coastal communities dependent on coastal resources for their livelihood and neither is there a commercial fishery due to busy shipping in the restricted sea space. The socioeconomic, biophysical, and political settings of Singapore as a highly urbanized coastal city may be different to other coastal cities. Still it is essential to note

that IUCM is considered relevant to the further development of the country as it strives for elevated levels of sustainability and climate change resiliency.

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Achieving Integrated Coastal Management Scaling Up throughout the Coastline of Selangor, Malaysia

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Key Message

- The scaling up of an integrated coastal management (ICM) program throughout the entire coastline of the State of Selangor, Malaysia, was achieved through effective demonstration and replication of local-based ICM practice.
- Scaling up ICM programming was supported by state legislative measures which ensured sustainable budgetary allocation and continuous capacity development at the local level. The role of the Selangor Water Management Authority (LUAS), a leading state institution, as the facilitator was also critical.

Abstract

Over the past 15 years, Selangor made significant progress in demonstrating the benefits of an ICM program. The implementation of ICM helped resolve several coastal use issues and convince the State government to support the development and implementation of strategies and management plans for

the sustainable development of its entire coastline. The efforts to gradually scale up ICM practice throughout the state closely followed Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) Framework for Sustainable Development of Coastal Areas (SDCA) and LUAS Enactment of 1999. The gazettelement of ICM enabled LUAS to secure needed budgetary allocations and funds as well as commitments from the state government and other stakeholders.

Background

Selangor's coastline, stretching from Bernam River to Sepang River ([Figure 1](#)), has always been a source of fascination. The coastal ecosystems in the area offer a variety of valuable habitats for numerous plant and animal species and provide important ecosystem services.

The scenic beauty and richness of the goods and services that coastal zones offer have made them popular areas for settlement, tourism, and other important businesses such as port hubs and transit points. However, population growth and excessive exploitation

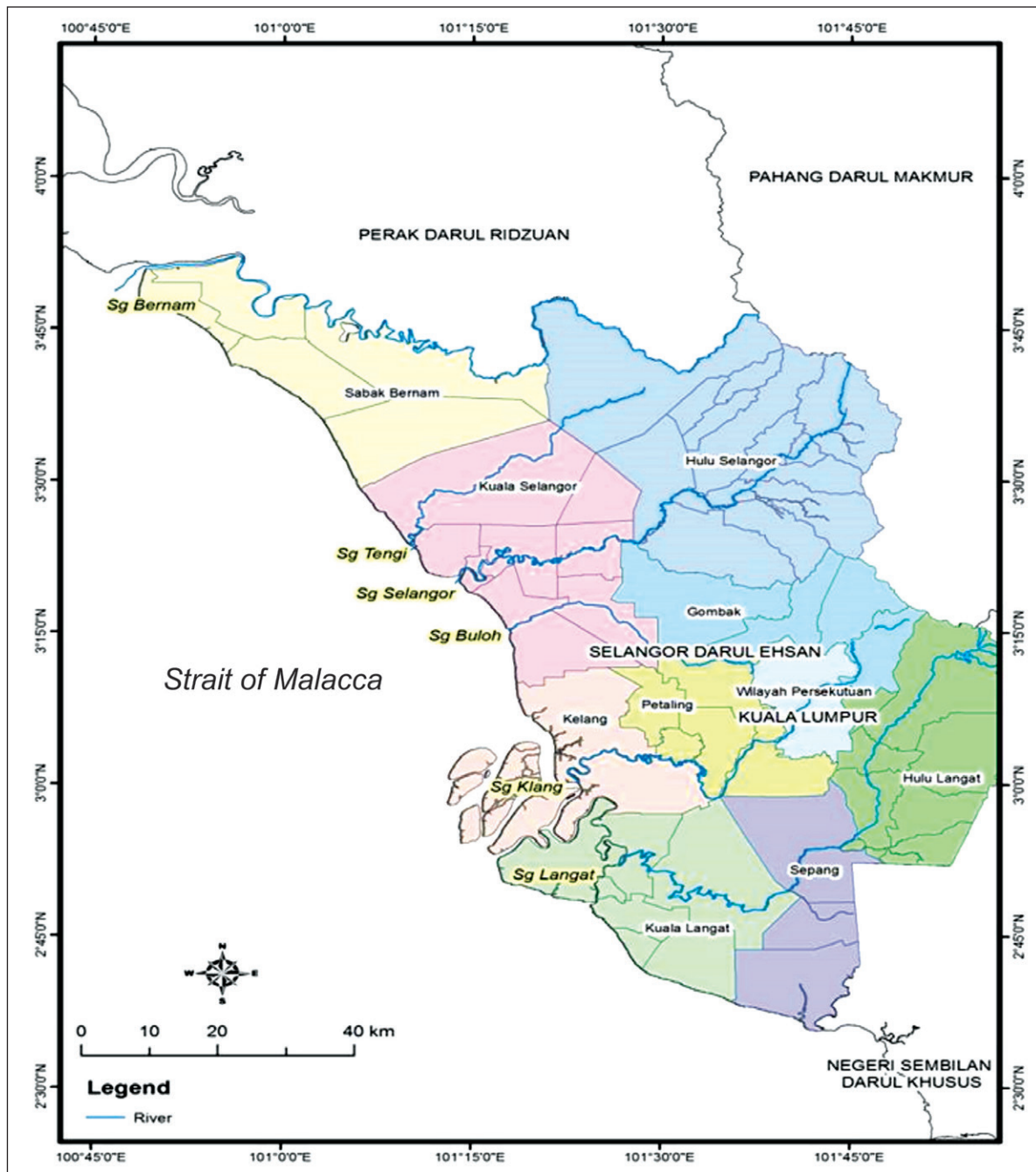
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of natural resources have exerted enormous pressure on the coastal ecosystems, leading to biodiversity loss, ecosystem degradation, coastal erosion, pollution, multiple use conflicts, and space congestion problems.

In order to address these problems and to preserve the coastal areas for present and future generations, PEMSEA provided the needed working

methodology for promoting effective coordination and integration of policies and functions of concerned agencies through the implementation of an ICM program (Chua, 2006). The State Government of Selangor adopted the ICM approach in 2001. In the past decade, the state government made significant progress in expanding its management plans and strategies for sustainable development by promoting ICM practices.

Figure 1. Selangor coastline.



Approach and Methodology

In line with PEMSEA's Sustainable Development Strategy for the Seas of East Asia (PEMSEA, 2003), the Port Klang Coastal Strategy was formulated and adopted by the Selangor State Government in August 2007 (LUAS, 2005). The process for developing the coastal strategy followed PEMSEA's "Guide to Developing a Coastal Strategy" and entailed a series of consultations with various communities, government, and nongovernment organizations as the principal stakeholders (PEMSEA, 2001). The Coastal Strategy outlined a concerted action program to achieve the clearly defined vision and mission for the State's coastal areas. The strategy also served as a guide for future sustainable development in the area by addressing current and emerging issues and challenges.

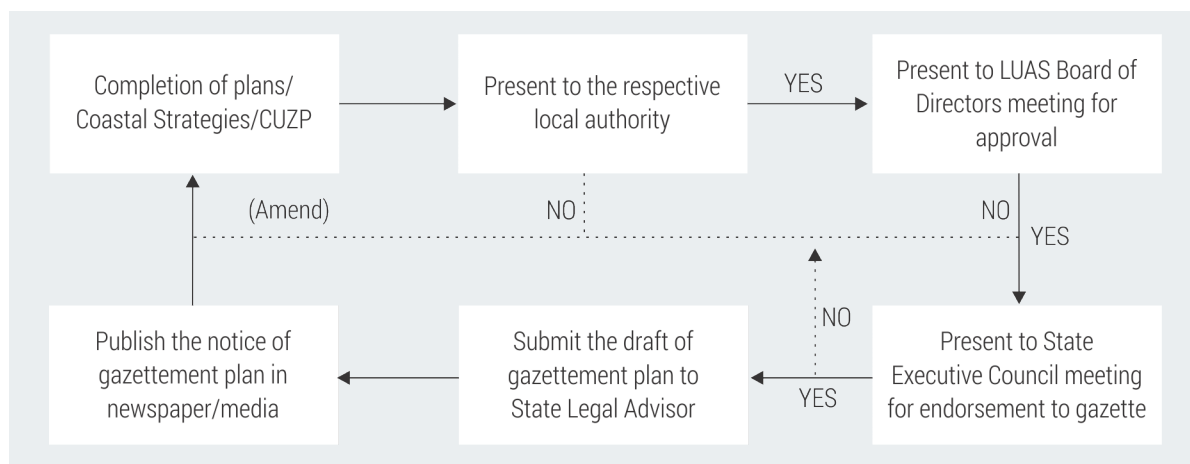
The Coastal Strategy also complemented the SDCA Framework which PEMSEA advocated starting 2007¹. The action plans took into consideration the various sustainable development aspects focusing on habitat restoration and management, water use and supply management, pollution reduction, waste management as well as natural and man-made hazard prevention and management. This was to ensure that the numerous issues related to conflicting uses of

coastal resources, habitat loss, and pollution, identified in the early stages of the development of the Port Klang ICM program, were systematically addressed.

The process of developing the ICM program and plans in Selangor was in accordance with the LUAS Enactment of 1999 that required the state to develop and implement integrated management plans, as stated in Section 46. Under this section, LUAS was mandated to develop and implement an integrated management plan for the conservation and sustainable development of any water resources (LUAS, 1999). To start the implementation of ICM and the replication processes, LUAS secured the approval at its Board of Directors Meeting, chaired by the Chief Minister of Selangor State.

Thus, the state gazetted the Port Klang ICM Plan in 2010 and the Northern Selangor ICM Plan in 2013, while the Sepang ICM Plan was gazetted in 2015. Gazetting of the ICM Plans aimed to provide the legal basis for action plan implementation, particularly that of the Coastal Use Zoning Plans (CUZPs). The process of gazetting the ICM plans involved several steps (Figure 2).

Figure 2. Flow chart of gazetting processes.



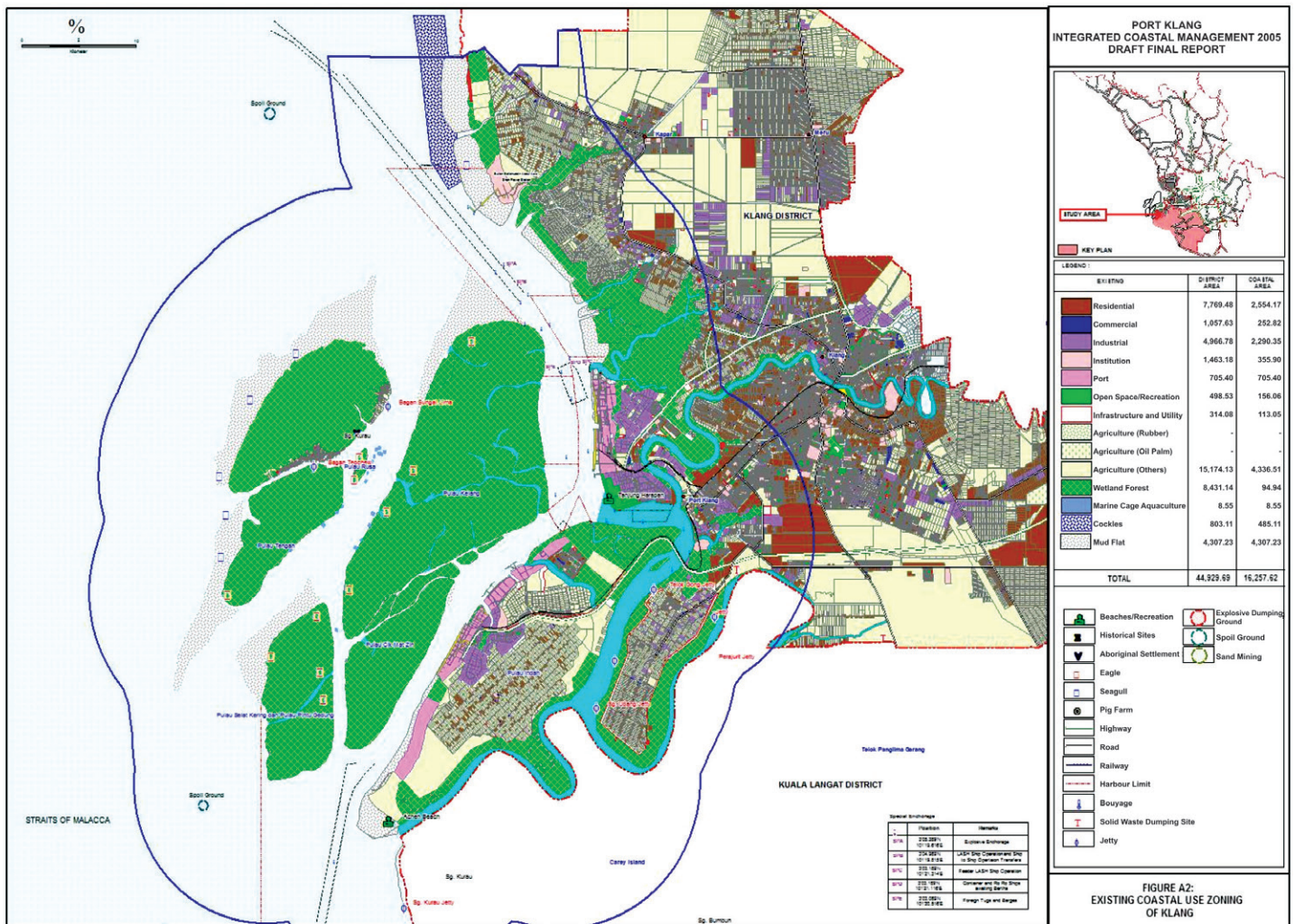
¹ For more discussion about the SDCA Framework, see Bonga and Chua (this volume).

The local government for each concerned district/council established the coordinating mechanism, developed coastal use zoning (Figure 3) and other action plans, and enhanced public awareness to facilitate the implementation of the ICM programs. Table 1 provides an overview of the activities accomplished by the local governments.

Since the gazettement of the ICM Plan was contingent on the LUAS Enactment, LUAS

served as the lead agency in coordinating the implementation in cooperation with all stakeholders. The necessary budget was allocated for local authorities and other stakeholders. LUAS also allocated an annual budget for ICM implementation covering the state's coastline, in addition to financial contributions from concerned stakeholders and local authorities. The budget for ICM implementation typically came from the State Economic Planning Unit under the development budget.

Figure 3. Integrated CUZP for Port Klang ICM site.



Results

The ICM approach was proactive and equitable. It provided the needed sustainable development framework and processes for the State of Selangor to meet the needs of its coastal stakeholders through holistic and long-term socioeconomic and environmental planning. The implementation of an ICM program started in 2001 in Port Klang (Table 1), consisting of the Klang and Kuala Langat districts, with technical support from PEMSEA. The ICM approach was replicated in 2007 in Northern Selangor areas covering the entire coastline of Kuala Selangor and Sabak Bernam districts. In 2013, the ICM program was extended to Sepang, the last part of the state's coastal areas. The local governments of Sabak Bernam District Council, Kuala Selangor District Council, and Sepang Municipal Council were heavily involved in the development and implementation of their respective ICM programs. Thus, in over a span of 15 years, ICM coverage has expanded to include the entire 291-km coastline of Selangor.

In addition to ensuring that financing was made available for the implementation of the ICM

plans, the involvement of line agencies and other key stakeholders' was considered as one of the key indicators for the implementation of a successful ICM program and scaling up activities. Stakeholders played an important role in ICM plan development and implementation since the inception of the Port Klang ICM program (LUAS, 2005). They were actively involved in numerous workshops, trainings, and meetings. In addition, the Coastal Strategies for Port Klang, Northern Selangor, and Sepang ICM sites, which served as the framework plan for integration and implementation of various activities, were formulated based on stakeholder feedback and recommendations. The action plans provided the basis for the development of annual municipal and district council development plans; allocation of an annual budget; and the identification of roles and responsibilities of various concerned line agencies. The effectiveness of ICM as a tool for sustainable management of the Port Klang coastline helped resolve many coastal use issues. This convinced the state government to expand the implementation of ICM to Northern Selangor and Sepang District, thereby expanding ICM coverage to all its coastal areas.

Table 1. Basic information on the implementation of ICM program in the State of Selangor.

District	Klang	Kuala Langat	Kuala Selangor	Sabak Bernam	Sepang
Total land area (km ²)	626.78	857.75	1,056.32	1,194.55	619
Total coastline (km)	76	80	60	60	15
Total population	110,000	21,000	52,302	50,901	28,300
Gross domestic product	5.8% (2013)				
Coastal Strategy	Port Klang Coastal Strategy Implementation Plan		Northern Selangor Coastal Strategy Plan		Sepang Coastal Strategy Action Plan
Coordinating mechanism	established/ functioning				
ICM program developed and implemented	2001-2007		2011-2013		2013-2014
Zoning plan established	2009 (gazetted)		2013 (gazetted)		2015 (gazetted)
Budget allocated	Average RM 200,000 (about US\$ 48,000) yearly				
Current status	continuous				

Lessons Learned

Implementing ICM in Selangor in the past 15 years has provided many valuable lessons:

1. The integrated planning and management approach is in line with and is supported by LUAS Enactment of 1999, thus providing a **legal basis** for LUAS to facilitate and **promote ICM program development and implementation** and to play a lead role in scaling up to cover the entire coastline.
2. The success of Port Klang as the first pilot site of PEMSEA generated interest, confidence, and capacity to systematically undertake ICM practice, which provided the **local working model for ICM** scaling up to other coastal areas.
3. The **gazetting process ensures long-term implementation of ICM program** with opportunity to secure needed funds from the state government. It also ensures verification of the appropriateness and effectiveness of ICM program, a process that leads to internalization of ICM in planning and management of the coastal areas.
4. A **state lead agency** such as LUAS **plays a critical role** in coordinating, facilitating, and streamlining ICM practices into the state economic development program.
5. The scaling up of ICM practices throughout the entire coastline of Selangor demonstrates the importance of **continuous capacity development efforts at the local level**.
6. The **involvement of local government and collaboration from stakeholders are prerequisites for the successful implementation of ICM programs**. Strong political will and commitment, public awareness, and improved management capacity are important drivers, not

only for program achievements and sustainability, but also for addressing current and emerging challenges arising from continued degradation caused by anthropogenic activities and climate change.

7. **Continuous support and funds** from the state government have a positive impact on the implementation of the action plan to the entire Selangor coasts.

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Strengthening Local Capacity for ICM Implementation and Scaling Up in Preah Sihanouk, Cambodia

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Key Message

- Integrated coastal management (ICM) can be applied in developing areas where capacities, both human and financial, are limited.
- The ICM system helps to develop technical and leadership competencies in local practitioners so that they become effective agents of change.
- Support increases for ICM when acquired skills translate to changes in the governing institutions and the implementation of projects that are beneficial to stakeholders.
- The benefits derived in Preah Sihanouk, Cambodia, and the continuing implementation by the provincial government have led to stronger acceptance by stakeholders and interest from other coastal provinces. All four coastal provinces have now adopted ICM.

Abstract

ICM was introduced to Preah Sihanouk Province (formerly the Municipality of Sihanoukville) in 2001 to address conflicting uses of the coastal area, which were resulting in increasing deterioration of the environment. Having emerged from a turbulent past, human and local institutional capacity was severely constrained. Coordination was poor among institutions, planning was inadequate, and technical capacity was lacking. People were still rebuilding their livelihoods and securing participation was difficult unless it ensured immediate benefits of livelihood improvement.

The ICM program was among the few initiatives in the country where the responsibility of managing and implementing a project was given to a municipal government. Capacity development was therefore critical as the implementation would rely heavily on local staff. A two-pronged approach that

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provided immediate benefits while at the same time prepared institutions for long-term engagement was necessary. Organizing a management mechanism to run the ICM program was by itself an achievement and it was accomplished by building on existing human capacity and developing basic institutional capacity on program implementation as well as individual skills and competencies through a stepped-up effort as the program developed.

ICM implementation requires people that are resourceful and willing to learn. They must be willing to share power and resources, and to inspire others into action. ICM is now institutionalized in the provincial government with the upgrading of the Project Coordinating Committee into the Coastal Development and Management Committee. The Preah Sihanouk ICM Demonstration program has influenced policies, prompting positive reforms on coastal and marine management at the national level and created opportunities for scaling up. ICM is currently implemented in all coastal provinces in Cambodia, with Preah Sihanouk ICM staff being able to guide the coastal provinces on the implementation aspects.

Background

Sihanoukville Municipality became Preah Sihanouk Province through Sub-decree No. 07 issued on 9 January 2009. The province is designated as one of the three economic development areas in Cambodia and serves as a commercial gateway for local and international trade with its deepwater port facing the Gulf of Thailand. Its beaches and islands make it one of the country's most popular tourist destinations. With abundant resources and opportunities for economic development, Preah Sihanouk's coastal assets were subjected to conflicting uses, leading to deterioration of the coastal and marine environment. Five key

management challenges in the province included habitat loss and modification, marine pollution, coastal erosion and siltation, groundwater extraction, and multiple resource use conflicts. Management was unable to effectively deal with such problems due to poor coordination among institutions; inadequate planning, policies, and legislation; low level of public awareness; and lack of financial and technical capacities.

Adding to these problems was the strong sectoral and centralized approach of local governance. The political framework and the supporting legal system were still largely under the authority of the central government. Prior to ICM implementation, agencies that were involved in policymaking and management worked individually, guided only by their own objectives. Conflict of interests and unclear management boundaries were common among the agencies.

Sihanoukville commenced ICM implementation in 2001, barely a decade after the UN Transitional Authority was established in the country. The ICM program was initiated in a society that was still grappling with the ghosts of a nation's past. Institutions were not ready for organized action and people were still finding ways to survive and viewed the government system with disenchantment and distrust. With poverty incidence of more than 32% in 2001 (PG-Preah Sihanouk and PEMSEA, 2013), protecting the environment was definitely not the first priority. Securing participation was difficult unless the activity ensured an immediate benefit of livelihood improvement.

ICM implementation faced two huge challenges. First, most development projects in Cambodia in the early 2000s were administered at the national level, and as a result, local capacities were not built and institutions remained largely reliant on ministries located in the country's capital. In

many cases, concluded projects and programs ceased to exist when external funders exited, as local capacities and institutions were not ready to financially and technically continue them. The Sihanoukville ICM program was, at that time, among the few initiatives in the country to have accorded a municipal government with the responsibility of managing and implementing a project.

Second, stakeholders were not organized and mobilized for collective action. For a society just emerging from a turbulent period, an integrated approach that can mobilize people was difficult as fragmented communities had to be first convinced of the value of collective action. Benefits of coastal and marine management take time to be noticed, especially if interventions were focused on habitat protection alone. A mixed approach that provided immediate economic benefits while preparing institutions for long-term engagement was necessary when considering capacity development initiatives.

Several obstacles stood in the way of accomplishing capacity development and stakeholders' participation. When ICM was just established, data and information were scant and scattered among different agencies, which meant that analyzing local problems and vulnerabilities was more difficult. Only a few staff at the municipal hall could communicate in English limiting interaction between PEMSEA project staff and the local counterpart. Communication and transportation facilities were also poor. Sihanoukville's bus and taxi services were erratic, roads unlit and unpaved in many areas, and Internet and communication facilities were expensive and, in many cases, did not work after heavy rains. Setting up a Project Management Office (PMO), much less making it work, was a major challenge.

Approach and Methodology

Preparing and initiating ICM implementation (2001–2003)

As part of the preparatory stage of ICM, PMO and the Project Coordinating Committee (PCC) were established in November 2001 through the issuance of *Deka*¹ 074 and *Deka* 080, respectively. The PCC was the decisionmaking and coordinating body composed of directors and deputy directors from line agencies while PMO, composed of four staff at that time, served as the secretariat to PCC. Although established, the capacity to perform their designated functions was limited, and up to 2002, both were not fully functional and integrated into the local development processes.

To address this, capacity development involved a two-pronged approach: training in administrative and technical aspects for PMO staff while strengthening acceptance and political support from local leaders. Technical training involved on-site and remote coaching, workshops, and field activities. The other track was conducted over shorter duration with more site visits rather than classroom instruction. This approach was matched with regular dialogues — both formal and informal — and short-term executive training courses.

In setting up the project, PEMSEA conducted a two-month mission in 2002 to mentor the core staff — four at that time — on basic project operations. These included financial management and reporting, use of personal computers, record keeping, and project reporting. The first phase of training focused on administrative aspects, such as financial management and reporting through a short “classroom” training by PEMSEA staff

¹ *Deka* – local ordinance.

“Initiating the ICM implementation in Sihanoukville Municipality, at that time, was a difficult process. I was assigned in PMO as I had some basic English language skills and can communicate with different stakeholders. There were many organizations who came here and asked us questions but they never came back.”

Prak Visal

Technical Officer
Project Management Office (PMO)
Sihanoukville ICM Program

and members of the Regional Task Force² (RTF) followed by continuous coaching and/or actual exercise. The process was long and painstaking since the technical capacity of the staff, technology, and language at that time, were very limited.

Aside from the problems of limited capacity, getting stakeholder support was challenging at the start. The first step was to convince the core group to follow the “ICM process” and that on-the-ground application would be more effective if the planning was done right. This was a challenge for Sihanoukville as many local implementers were adamant of change and wanted immediate action, with less emphasis on the planning aspect. During the first year of implementation, PMO was under great pressure to produce results. Getting implementers to appreciate stakeholders’ participation was difficult as the team used to think that consultations were just an added layer of work and that they, as implementers, already knew what the communities would say as well as the underlying causes of marine and coastal

management issues. Rather than explaining the logic of getting stakeholders involved in the process, the team was mobilized to conduct activities and interact with communities. It gave the local officials, as the implementers, a degree of confidence in the knowledge of communities and the socioeconomic problems that affect use of coastal resources in the villages.

Parallel to building technical competence was getting stronger political support for implementation. This was critical as the ICM plans have to be adopted by local officials who need to be convinced of the benefits. As part of capacity development, the governor and deputy governors participated in the PEMSEA Network of Local Governments’ Forum. Their interaction with other local governments in the region imparted a degree of legitimacy to ICM initiatives and confidence in the process of implementation.

The PMO staff also kept a close relationship with the office of the governor, which made convincing local officials easier. At the national level, the project was implemented directly under then Environment Minister Mok Mareth’s office, thereby generating a higher level support and giving legitimacy and credibility to the project.

Developing and adopting stage (2004–2008)

The development and adoption stage required a more technical and focused approach to implementation. The Coastal Strategy (CS) was developed and adopted in 2003 with the signing of the CS declaration by former Minister Mok Mareth and the different stakeholders. In 2004, the Coastal Strategy Implementation Plan (CSIP) was prepared, following a series of stakeholder consultations to identify the three priorities for implementation. While the adoption of CS and

² PEMSEA’s RTF is composed of skilled professionals outside Cambodia who provide technical support to topic-specific capacity development.

CSIP was important in generating awareness and support for ICM implementation, Sihanoukville was a developing municipality in need of more concrete demonstration of the practical benefits of ICM. The development of management plans was done in parallel with implementation of priority projects. Beach management, solid waste management, and fishery-related initiatives were among the first few projects implemented to show how integrated management approaches can improve livelihood, community cleanliness, and overall health. These projects were done on smaller scales at the village level to demonstrate changes and for the team to be able to manage the implementation process.

An important dimension of the process was the involvement of department leaders and staff. While the different line agencies were expected to lead the implementation, many were still caught in internal battles of setting up their own offices, struggling to exert control within their respective departments and unwilling to share responsibilities, resources, and “power”, while others were awaiting orders from their “mother” ministries at the national level.

To many, working together under the ICM program was a threat to the newly acquired power of the line agencies and staff. Local institutions were also unclear of the roles and responsibilities, mandates, and reporting processes, making it difficult to pinpoint where accountability really laid. Despite initial animosity, the PMO staff made sure that the departments that had the mandate for related activities were informed of the activities and that good interpersonal relationships with leaders and staff were cultivated. They were initially part of the process of coastal use zoning, development of the coastal strategy, and implementation plan of 2003–2004, but in many of these, their involvement was limited to either sharing information or participating in workshops.

Aside from involvement with project activities, informal meetings also served to generate mutual

trust between and among PMO staff and line agencies. These relationships would prove useful in encouraging more active involvement among the line agencies in ICM-related initiatives. With the start of CSIP implementation in 2004, the key departments in charge of specific issues were asked to lead the task teams in field activities with PMO backing the operations and providing support on management.

For instance, the implementation of community-based solid waste management was led by the Department of Environment; the beach management by the Department of Tourism; and the Stung Hav fishery management by the Fisheries Administration. Giving departments the leadership roles, while guiding them in the process, created stronger buy-in and commitment from department heads and staff. The implementation also provided the line agencies the opportunity to touch base with communities and various stakeholders, which would be useful later on in executing the mandates of their own departments. It contributed to strengthening their roles in fulfilling their mandates, so that the development initiatives could be sustained as part of their own efforts over a longer period.

The RTF was again tapped to provide on-site support for training workshops on coastal use zoning, beach management, and pollution reduction. The role of the local Royal University of Phnom Penh (RUPP) was also significant in assisting the team with the development and implementation of the pilot-scale community-based solid waste management activity. [Table 1](#) summarizes the major activities and related capacity development initiatives.

Results

Experiences in the demonstration initiatives and activities were used by the departments to initiate other projects. [Table 2](#) indicates the specific projects

Table 1. Key project and related capacity development initiatives undertaken at different stages of the ICM cycle.

	Major ICM activities	Related capacity development initiatives
Preparing stage 2001–2002	<ul style="list-style-type: none"> • CSIP issue and area-specific action plans • Coastal use zoning • Integrated environmental monitoring • Sustainable financing mechanisms 	<ul style="list-style-type: none"> • PEMSEA' s mission to provide support in setting up PMO and conduct financial and project management training
Initiating stage 2003–2005	<ul style="list-style-type: none"> • CS • Coastal use zoning plan • Tourism development and management plan • CSIP • Laboratory Office established • Capacity building 	<ul style="list-style-type: none"> • Training Workshop on Coastal Strategy Development (RTF supported) • Training Workshop on Setting Up the Sihanoukville Environmental Laboratory
Developing, adopting and implementing stage 2006–2009	<ul style="list-style-type: none"> • Ochheuteal Beach (OB) tourism development and management • Community-based solid waste management in Sangkat 4 Sihanoukville Municipality • Sustainable marine fishery rehabilitation and management in Stung Hav district • Integrated beach environmental monitoring program 	<ul style="list-style-type: none"> • Training Workshop on the Development of the OB Tourism Development and Management Plan (RTF-supported) • Training on community-based solid waste management (RUPP-supported) • RTF-supported mission on beach water quality monitoring
Developing, adopting and implementing stage 2010–2014	<ul style="list-style-type: none"> • Establishment of marine fishery management area in Prek Kampong Smach and Koh Rong • Development of ICM sustainable development plan • State of the Coasts reporting • Wastewater management along beach and city • Feasibility of environmental user fee/ foundation • Environmental plan and development of penalty guide • Climate change adaptation • Integrated beach environmental monitoring program • Port safety, health, and environmental management system for Sihanoukville Autonomous port • Capacity building 	<ul style="list-style-type: none"> • Community-based Training on Fishery Law Enforcement • District and Commune Level Workshop led by Technical Working Group (TWG) on development of sustainable development plan • TWG-led wastewater management discussions • Feasibility study on user fee (with national task force support) • Climate change adaptation (UN Habitat, national partner)
Refining and consolidating stage 2013–2015	<ul style="list-style-type: none"> • ICM project site scaling up • Revision of CS • Revision of coastal use zoning plan • Revision of tools, technique, and instrument for integrated beach environmental monitoring program • Planning for the next program cycle • Updating State of the Coasts report • Targeting ICM recognition certification 	

Table 2. Specific projects implemented under the ICM program.

No.	ICM project partners	Project name	Project period
1	GEF UNDP Small Grants Programme	1. Sustainable Coastal Resources Management and Rehabilitation 2. Water Source Rehabilitation and Restoration 3. Mangrove Project and Livelihood Improvement in Ream Commune	2006–2013
2	International Center for Environmental Technology Transfer, Mie Prefecture	Environmental Conservation	2008–2009
3	UN-Habitat	Human Settlement and Climate Change	2010–2013
4	National Committee for Sub-National Democratic Development	Capacity Building and Natural Resources Conservation	2004–present
5	Food and Agriculture Organization	Regional Fisheries Livelihoods Programme	2008–2013
6	Cambodia Climate Change Alliance	Sustainable Sihanoukville through Climate Change Planning and Adaptation	2011–2013
7	Nihon University, Japan	Water Supply	2008–2009
8	Fauna and Flora International	Marine Ecological Conservation and Protection	2008–present
9	Coral Cay Conservation	Research on Coral Reef and Marine Biodiversity	2008–2013
10	Swedish International Development Corporation Agency and Swedish Embassy in Cambodia	Scholarship on Integrated Sustainable Coastal Development	2013–present

that were implemented through the ICM initiative and the subsequent replication projects undertaken by the line departments. It is important to stress, however, that two important factors — timing and urgency to address coastal and marine issues — contributed to implementation and scaling up of the pilot demonstration projects.

For instance, the beach management plan was developed early in 2004 but implementation was delayed due to limited government and private sector support. It was implemented in 2008 as tourist numbers increased and the national government took keener interest in Sihanoukville. Another example was the effort on community-based waste management. This pilot-scale project was scaled up to cover the Sihanoukville Municipality after *Prakas*³ 078 was signed by the Ministry of Environment, Ministry of Tourism,

and Ministry of Land Management. Through the *Prakas*, the provincial government was able to access US\$250,000 from the Ministry of Environment Fund for waste management in the province.

The working groups formally evolved to become the Technical Working Group (TWG) in 2009. The TWG, composed of directors/deputy directors from line agencies, facilitated the interdepartment cooperation and dialogue in ICM implementation and also information sharing. Task teams, composed of a representative from the province, community leaders and key stakeholders in target villages, were later organized to implement specific projects. As the lead agencies took on a greater role in implementation, the PMO's role evolved to become more of a support group, providing administration and backstopping.

³ *Prakas* – a ministerial or interministerial decision or proclamation.

“We have had four governors since we implemented ICM. This meant four different styles of leadership, and ICM has helped us work well with our leaders. I think that is one good result of capacity building: being able to adapt to different management styles.”

Sally Nay
 Technical Officer, PMO
 Sihanoukville ICM Program

Capacity strengthening and scaling up

Encouraged by the progress of ICM implementation in Sihanoukville, the PMO through its interaction with other coastal provinces, was able to generate wider interest from local officials of Kampot, Kep, and Koh Kong Provinces. In 2008, the three provincial governors of these coastal provinces requested the Ministry of Environment (MOE) and PEMSEA for support to set up ICM. The three provinces participated in the National ICM Training co-organized by MOE, RUPP, PEMSEA, and the provincial government of Sihanoukville. Despite initial scepticism from concerned staff from the newly joined provinces, the PMO was successful in convincing the other provinces to participate in regional activities such as the annual forum of the PEMSEA Network of Local Governments (PNLG). To date, the Preah Sihanouk Province was able to facilitate the membership of the above three coastal provinces by assisting them in seeking the approval of the Ministry of Interior to be members of PNLG and subsequently, applying as members to PNLG. They were accepted as new members in May 2016.

As part of the scaling up initiative, the Preah Sihanouk ICM PMO organized two key training workshops, including the project and financial management on 10–11 June 2016 and extended technical support to its neighbor, Kampot, on the development of its coastal use zoning scheme on 19

July – 11 August 2016, mobilizing RTF members from the Korea Maritime Institute.

Continuous networking of PMO staff and local officials also resulted in several projects being scaled up or replicated with national or external funding support (Table 2). These created more opportunities to address the priorities indicated in CSIP and to build competence of technical staff in the implementation process.

Making changes and creating opportunities

While it cannot be claimed that ICM is the sole driver in many positive developments on coastal and marine management policies, it can be said that ICM in Preah Sihanouk has catalyzed some of these changes.

Cambodia officially became a member of the Most Beautiful Bays in the World Club on 26 May 2011. This was a result of the application made by Preah Sihanouk Province during the Club's Sixth Congress in Halong Bay in May 2010. Subsequent evaluation of sustainable management practices and economic potential in the province was made within a year in several meetings held in Sihanoukville. The Ministry of Tourism then extended the application to cover the entire coastline and other provinces to encourage effective coastal management, hence the inclusion of Cambodian Bay which spans 440 km across the coastal provinces of Kampot, Kep, Koh Kong, and Preah Sihanouk.

Following the acceptance of Cambodia to the club, Prime Minister Hun Sen signed Circular No. 1 on the Development of Coastal Areas of the Kingdom of Cambodia on 12 February 2012. The circular served as a guide for the ministries, institutions, and subnational governments to implement the principles in the management, utilization, safeguarding, protection, and development of the kingdom's coastal areas. The circular provided definitions of the offshore area, islands, beaches, coasts, and right of passage; and the use and

development of islands for residence, coastal area development and construction, which is useful in implementing zoning. The government recently made a clear pronouncement of its commitment to remove illegal infrastructure along the beach to protect coastal integrity.

Adding to the above achievements was follow-on Government Decision 152 on 13 July 2012 which established the National and Provincial Coastal Management and Development Committee (CDMC). The committee was tasked to oversee the development projects at national and provincial levels. This was significant as it encouraged the provinces to set up their coordinating mechanism for coastal management. For Preah Sihanouk, the PCC was upgraded to the CDMC, thereby formally institutionalizing the coordinating mechanism. It currently has 28 members and is chaired by the governor, and two deputy governors, and the port director as the vice chair.

Lessons Learned

Developing a modest management capability is necessary to begin implementing an ICM program

Coming from a difficult past where institutions were still being rebuilt, organizing a management mechanism to run the ICM program was in itself an achievement. This was done by building on existing human capacity with basic technical knowledge and management skills for project/program implementation, which were carried out over time through a series of training workshops, field activities, and feedback exercises. This was done through a stepped-up effort, with support and advice from PEMSEA.

Skills and competencies are developed at different stages of ICM implementation

Different capacities were needed to implement different levels of ICM activities as the program

matured. At the initiating and preparing stage, interpersonal skills to gain trust and build working relationships were of primary importance. In the development and adoption stage, technical competence on specific topics was necessary to effectively implement the projects. Networking with other groups, where local capacity was not available, was done to ensure that project activities could be implemented. As ICM matured and scaling up got started, lobbying skills became essential together with the capacity to generate more resources for implementation of coastal and marine management projects.

Strengthening of individual capacity at the local level improves institutional capacity making agencies more functional and effective

The capacity development initiatives were rooted in building individual competencies and eventually relying on these individuals to coordinate with concerned departments. Building good personal and working relationships with heads of departments facilitated effective cooperation, which eventually led to better cooperation in implementation. The engagement of staff from concerned departments in the implementation was done through the help of regional and national support groups of PEMSEA. The capacity development efforts increased the community's trust and support to government-led initiatives.

Maintaining harmonious working relationship with concerned departments is absolutely necessary

ICM relied heavily on changing perceptions and attitudes to become more receptive to collaboration. Engaging the key departments in project activities and reducing apprehension of losing authority or resources, made them more receptive to the concept and practices of ICM; eventually making it easier to involve them in project activities.

Stakeholders participation promotes collective community action

The ICM initiatives often engaged different levels of stakeholders. In Sihanoukville, these included district, commune, and village leaders who were instrumental in the process of ICM implementation. Village level implementation ensured that the communities in need of support were able to benefit from the initiatives.

ICM implementation requires positive attitude, resourcefulness, and willingness to learn

ICM provided opportunities for technical training of staff to enable them to effectively develop implementation strategies. However, the core principle of integration could only be promoted by people who were willing to share power, resources, and able to inspire other people into action. Positive attitude built better relationships that could facilitate collective action. Personal relationships could be a starting point in gaining support for ICM implementation.

Experience is the best teacher

This cannot be sufficiently underscored. Training and classroom education were important but people learned more from application and field activities. Demonstrating how things were done created better awareness and understanding. Capacity development should therefore be planned carefully enough so that the initiatives match the planned projects to be implemented.

Balance between simplifying concepts and increasing capacity for analysis

There was a tendency to speed up implementation as the demand for change and associated benefits increased, especially in poverty-stricken areas. Livelihood projects needed to be thought out carefully before implementation, in order to

increase the rate of success. In the process of developing projects and programs, analytical skills on root causes of problems should be developed, rather than on hastily implementing measures.

Capacity to seize opportunities

There are broader sociopolitical and economic factors that can make or break an ICM program. ICM capacity development can and should strengthen staff capacity so that they are able to seize the best opportunities in forwarding the objectives and impacts of ICM. For instance, the decision to set up CDMC at the provincial level clearly opened up opportunities for institutionalizing ICM into the provincial government. Thus, the Sihanoukville PMO made sure that the existing PCC was upgraded to become CDMC of the Province of Preah Sihanouk.

Reference

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Integrated Coastal Management Implementation and Scaling Up in Chonburi Province, Thailand

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Key Message

- The integrated coastal management (ICM) concept and approach were adopted and successfully demonstrated in five municipalities in Chonburi Province, Thailand. Over a span of 15 years, the ICM practice was effectively scaled up to cover all the 26 coastal and 73 noncoastal municipalities of the province utilizing local/provincial and national financial and human resources.
- A national decentralization policy mandating management responsibilities to local governments was a contributing factor to stronger commitment of resources for the implementation of ICM programs.
- The success in ICM implementation and scaling up was attributed to the continuous process of capacity building of local officials and institutions and greater involvement of local and national scientific research and educational institutions.

Abstract

Rapid economic development in the last 20 years transformed Chonburi's economy from agriculture and fisheries-based to industry-based, causing the degradation of marine and coastal resources and the coastal ecosystems.

Thailand's government structure at that time was being decentralized to give local governments the mandate and authority to manage natural resources and the environment. Thus, when Chonburi Province was selected as a PEMSEA national demonstration site, the provincial authority took the opportunity to address its key environmental concerns as well as to strengthen local capacity in marine and coastal management.

The project began in 2001 with the participation of five coastal municipalities and a project office hosted by Sriracha Municipality. Through the systematic and participatory process of ICM program development, a long-term coastal strategy was prepared and adopted by the provincial government and the five municipal governments in September 2004. A Provincial

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Order was issued to streamline the initial interagency and multisectoral ICM coordinating mechanism, with Sriracha Municipality serving as the Secretariat for the ICM project.

Through annual ICM scaling up promotion activities from 2006 to 2009, all 99 local governments in the province became members of the ICM network and committed to implementing the Provincial Coastal Strategy.

Background

Chonburi, a coastal province 80 km southeast of Bangkok in the Upper Gulf of Thailand, has a land area of 4,363 km², a 160 km coastline and a population of 1.3 million. Its nature parks, heritage sites, cultural events, and local produce attract foreign and local tourists. It is also a center of marine fisheries and aquaculture in the Upper Gulf of Thailand.

The Eastern Seaboard Development Project, a long-term project of the Thai Government, was launched in 1981 aiming to expand economic development from Bangkok to other provinces. This move transformed Chonburi and its adjoining provinces into industrial centers and direct gateways for import and export (Narcise and Sujarae, 2004). This was accompanied by continuous development of important public infrastructure, including roads, electricity, waterworks, and harbor for domestic and international transport, in order to serve industries such as petroleum, steel, and oil refining.

The rapid development of Chonburi within 20 years resulted in the deterioration of the marine and coastal environment and resources; reduction in fisheries production; increase in pollution from solid, liquid, and toxic/hazardous wastes; increase in air pollutants; and visible degradation of beach areas as well as natural, historical, and cultural sites

which were also major tourist destinations. These were having adverse socioeconomic consequences to sectors and communities that were dependent on healthy marine and coastal resources, including fisheries and tourism (Narcise and Sujarae, 2004; PEMSEA and Chonburi ICM PMO, 2004).

A government decentralization process in 1999, mandated by the 1997 Constitution, delegated the management of natural resources and the environment to local governments, and emphasized people's participation in making decisions, formulating goals and policies, and management of their own localities. This highlighted the need to develop capacity of local governments.

ICM was introduced by PEMSEA around this time. The local government recognized ICM as a viable approach for continuing local development while sustaining the functional integrity of natural habitats as well as the local culture. Visits to ICM sites in other countries and witnessing the tangible outcomes and benefits of ICM implementation further inspired them to apply ICM in Chonburi (Thimkrajang¹, pers. comm.).

Approach and Methodology

Initiating ICM program development and implementation

The ICM project in Chonburi was initiated in 2001 in five municipalities: Sriracha, Laemchabang, Saensuk, Au Udom (now Chaoprayasurasak), and Koh Sichang. Their leaders saw the benefits of local development that takes into account marine conservation (Thimkrajang, pers. comm.). An ICM Project Management Office (PMO) was established and hosted by Sriracha Municipality. Core PMO staff and key government units were trained on ICM and project development and implementation. A senior level interagency and multisectoral ICM

¹ Chatchai Thimkrajang, former Mayor of Sriracha Municipality and Chonburi ICM PMO Director; current Head of Sriracha Municipal Council.

Project Coordination Committee (PCC) was also organized to provide policy and technical guidance for ICM development and implementation.

Adopting a common framework for action

The Coastal Strategy for Chonburi was completed in 2004 with the following shared vision of stakeholders: “Chonburi is an area with scenic and clean beaches and coastline, a popular tourist destination and center of socioeconomic development, where local people enjoy and care for the many bounties provided by the environment, protect Thai culture and traditions, and enjoy wholesome, secure and good quality of life” (PEMSEA and Chonburi ICM PMO, 2004).

The Coastal Strategy was adopted by the five municipalities and the province in September 2004 through an official declaration ceremony attended by representatives from the provincial and local governments in Chonburi, key national agencies and other stakeholders (Figure 1).

During the ceremony, the governor directed the Provincial Office of Natural Resources and Environment (PNRE) and concerned offices to integrate the strategy into the plans and programs of the province.

Improving institutional mechanisms for implementation

ICM implementation gained momentum in May 2006 with the issuance of the Chonburi Province Order No. 673/BE 2549, which requested relevant agencies and institutions concerned with natural resources and environmental management to collaborate and support the implementation of ICM programs in the five pilot sites identified by the local governments. The Provincial Order established an ICM PCC chaired by the governor

Figure 1. Coastal Strategy Declaration, September 2004.



and composed of heads of relevant agencies, academic institutions, and representatives from private sector and nongovernment organizations (NGO). The PNRE was named as the Secretariat to PCC. A Technical Working Group (TWG), led by the head of PNRE, was designated to coordinate the implementation of decisions of PCC. The Provincial Order also established a PMO which was composed of a consultative committee of the mayors and four working committees with designated municipalities to coordinate program planning, financing, implementation, monitoring and evaluation, respectively. Sriracha Municipality was identified the Secretariat to PMO. In June 2006, Sriracha Municipal Order 207/BE2549 was issued to support the establishment of an ICM Secretariat Office, designation of staff, and allocation of financial and other administrative and technical support, as needed by the ICM program. The mayor of Sriracha Municipality served as the director of PMO.

The official order from the provincial government was critical for getting commitments from stakeholders as well as for identifying the different sectors' responsibilities related to natural resources and environmental management, and for communicating expectations and directives

from the top level to concerned local implementers (Khunplome², pers. comm.).

Demonstrating the implementation of the Coastal Strategy in Sriracha

With the strong commitment and support of the mayor, Sriracha Municipality sent two technical staff for internship at the PEMSEA Regional Programme Office in the Philippines, in order to enhance their capacity and confidence to coordinate ICM program development and implementation. A key output from the internship was a draft medium-term Coastal Strategy Implementation Plan (CSIP) for Sriracha Municipality, which focused on enhancing awareness and understanding among stakeholders; promoting marine and coastal conservation, solid waste and wastewater management; and strengthening oil spill monitoring and response.

Sriracha Municipality was identified as a pilot site for adoption and implementation of the CSIP.

Some of the activities implemented as part of the CSIP included:

- conservation of marine species; release of sea turtles (Figure 2) and juveniles of aquatic

species, e.g., sea bass, shrimp and blue swimming crab into the sea; and protection of gravid female crabs in a protective structure until the eggs are released;

- habitat restoration (mangrove and seagrass planting) (Figure 2);
- training on environment-friendly coastal aquaculture, e.g., floating mussel farms;
- waste management (waste segregation and recycling, including establishment of collection facilities for recyclable wastes in schools and communities, and development of payment system for wastewater treatment);
- establishment and training of a volunteer group to support oil spill monitoring, reporting, and response;
- conduct of scientific research on potential impacts of a sea-based commercial operation on the ecosystem of Sriracha Bay and on the health of nearby communities (Box 1); and
- promotion of sustainable tourism development (establishment/improvement of coastal parks with sea turtle conservation pond, marine

Figure 2. Public awareness activities in Sriracha Municipality: sea turtle release activity with participants from various sectors (left); and seagrass planting with various stakeholders (right).



² Vitaya Khunplome, Head of Chonburi Provincial Administration Organization; current Chonburi ICM PMO Director.

conservation activities, and health facilities where people can exercise) (Figure 3); replacement of a causeway from the mainland to an island park that hindered water circulation (Figure 3).

Most of the activities were implemented with wide stakeholder participation, thus raising public awareness and commitment to environmental protection and marine conservation. Activities were also implemented in collaboration with various agencies and sectors which contributed financial, personnel, and technical support. Other municipalities and institutions were invited to participate in or to witness various ICM implementation activities.

Figure 3. Construction of infrastructure with inter-agency and inter-sectoral collaboration in Sriracha Municipality: waterfront improvement (above); and replacement of bridge that hindered water circulation (below).



Box 1. Use of science to support policymaking and management.

For four decades, the process of transferring certain commodities from small vessels to bigger ships in Sriracha Bay for international transport caused dust clouds that settled in the bay area (Figures 4A and B). No scientific evaluation of the impacts on the bay and living resources was conducted. The nearby local governments of Sriracha and Koh Sichang did not have the authority to address the problem as the area is under national government jurisdiction. Sriracha Municipality collaborated with researchers from the Sriracha Fisheries Research Station of Kasetsart University in 2006 to assess seawater, sediment and air quality, and benthic communities in the area. The research showed that sea-based operations have negative impacts on the local ecosystem. The results were brought to the attention of concerned national agencies (Figure 5).

Sichang municipality was subsequently granted the authority to govern its surrounding sea area under Act 2551 (30 October 2008) of the Ministry of Interior.

Figure 4. Transfer of dusty commodity from small boat to ship.



Box 1. Cont.

Sichang was the first municipality in Thailand to have a designated sea area and the authority to protect and manage the marine natural resources and environment, collect fees from shipping boats, and control shipping operations (Figure 6).

Figure 5. Presentation of research results to concerned agencies and sectors.



Figure 6. New administrative map of Sichang Municipality including the sea area.



Promoting ICM to other local governments

The mayor of Sriracha took every opportunity to explain the benefits of sustainable coastal development in various forums in the province, and interacted with other mayors and persuaded them to adopt the ICM approach.

Under the mayor's leadership and coordination of the ICM Secretariat at Sriracha Municipality, other mayors and senior local officials were invited to join the annual forum of the PEMSEA Network of Local Governments (PNLG) to learn from other ICM sites (Figure 7). Study tours to ICM sites (Xiamen, China; Danang, Viet Nam; Shihwa, RO Korea; Sihanoukville, Cambodia; Batangas, Philippines; Bali, Indonesia; and Shima City, Japan) and other locations (Tokyo and Osaka, Japan; Townsville, Australia; Netherlands; France; Belgium; and Germany) were organized for the local leaders and implementers to see good practices for themselves, and to motivate and inspire them to develop their municipality in a sustainable manner. The study tours also served as venues for local leaders in Chonburi to interact, discuss common issues, and share information and strategies for addressing the issues.

Officials from ICM sites in other countries also visited Chonburi Province, which provided further opportunities for information exchange and relationship building with their international counterparts (Figure 8).

Preparing a CSIP for five municipalities

Local governments in Thailand were required to develop a three-year social and economic development plan to serve as basis for requesting annual budget allocations.

Figure 7. Study tour of Chonburi officials in Shihwa, RO Korea on 20 June 2006.



Figure 8. Mayor of Sriracha receiving visitors from the Philippines in September 2006.



The plans were to be in accordance with national development strategies, and include proposed projects or activities which would be developed with people's participation. Plans or projects proposed for each year were required to have continuity covering three years with annual evaluation and feedback.

Collaborative planning workshops were organized involving local governments, concerned agencies and other stakeholders to develop a medium-term coastal strategy implementation plan (CSIP) for the five municipalities. The plan was prepared considering the priority needs, concerns, and mandates of each municipality; common concerns and potential areas of collaboration across municipalities; targets and priorities in provincial and national plans; and good practices from various areas. The CSIP was

prepared in accordance with the three-year local development planning process and included provincial policies and civil service protocols. The plan was approved by PCC and adopted as the Chonburi ICM Action Plan for 2006–2008.

The approach for developing the CSIP/ICM Action Plan for Chonburi was in fact a positive contribution to the planning process of local governments, in support of the newly issued regulation on local development planning. Compared to plans prepared under the centralized governance system, the resulting action plan was more reflective of the concerns and needs of local people, and thus was able to secure the cooperation and collaboration of stakeholders.

Implementing ICM programs

Initial implementation of the ICM Action Plan (2006–2008) focused on activities that were designed to generate political and stakeholder support for the local ICM programs and show visible results (Figures 9 and 10).

Scaling up of ICM implementation

The continuing awareness and capacity-building activities led to the adoption of the ICM policy and framework by other local governments in Chonburi (Khunplome and Wiwekwin, 2008; Kanchanopas-Barnette, et al., 2012).

Figure 9. Enhancing public awareness in support of environmental conservation and management in Chonburi: (a) lectures during environmental youth camps; (b) snorkeling as an activity in youth camps, to develop appreciation of marine resources; (c) drawing competitions on marine subjects; and (d) youths participating in mangrove planting.



Figure 10. Bicycle rally to promote marine conservation (left) participated in by local leaders and officials from various municipalities and other partners (right).



In March 2006, an additional five municipalities (Muang Chonburi, Angsila, Bangphra, Sattahip Municipalities and Bangphra Subdistrict Administrative Organization) signed the 2004 Coastal Strategy Declaration, formalizing their commitment and collaboration for ICM implementation and scaling up (Figure 11). Consequently, the ICM Action Plan for 2006–2008 was expanded to include the new participating municipalities.

Ten more municipalities, cities, and subdistrict administrative organizations joined in ICM implementation in 2007; two municipalities in 2008 and four in 2009, thereby completing the coverage of all coastal local governments.

By November 2010, all 73 noncoastal municipalities joined in ICM implementation, thereby scaling up ICM for the entire province of Chonburi.

Figure 11. Declaration of scaling up of ICM implementation in Chonburi, Thailand, in March 2006 (left) and in January 2008 (right).



Results

ICM implementation in Chonburi was sustained and scaled up over a 15-year period

Although environmental outcomes and impacts arising from ICM implementation have yet to be systematically assessed, there were visible changes such as habitat improvement, clean beaches, reduced solid wastes as well as improvement in income of local people. Reduced multiple use conflicts have encouraged local governments and stakeholders to proceed with their respective environmental conservation programs.

Increased public awareness and active participation in marine and coastal conservation programs

When the ICM program started, the support of local communities for environmental conservation was not strong. ICM played a significant role in encouraging and facilitating stakeholder participation (Kanchanopas-Barnette, et al., 2012). As the success of ICM hinges on changes in people's behavior and their support for conservation, most ICM program activities were designed to provide venues for stakeholders' education and mobilization (Figures 9 and 10).

Improving local government capacity

The ICM process has strengthened individual and institutional capacity, leadership and commitment of local governments to make decisions and manage their respective local areas, although local governments still depend on budget allocation from the central government.

A common vision and operational framework for coastal management

Whereas local governments previously developed policies and management actions on their own, the development and adoption of the Coastal Strategy for the province provided a common vision and framework for action by concerned local cities and municipalities. On the other hand, the process of developing and implementing the ICM Action Plans generated the needed opportunity for integration of policies, legislation, and management measures.

Stronger cooperation and reduced conflicts among stakeholders/sectors within the local governments were achieved

The consultative and participatory processes as applied in various aspects of ICM program implementation with its coordination and management mechanisms, facilitated dialogues, consensus building, and greater cooperation among concerned sectors, key stakeholders, and local line agencies.

The PCC served as a venue for policy and management decisions and coordination with the support of the TWG, and enforcement through PMO. Such mechanisms were proven to be effective in streamlining policy and management actions at the local level.

Network of local governments played an important role in promoting unity in addressing common challenges

Most local governments in Chonburi Province were able to work as a network with the same sustainable development goals, although some might have additional objectives specific to their localities. Working together helped to identify potential support across municipalities, especially human and financial resources, and advance their ICM initiatives more effectively and efficiently.

Creating an enabling environment for scientific involvement in local environmental management

In developing and implementing their ICM Action Plans, local governments recognized the need for technical support from concerned national agencies, local universities, and other research institutions in the country. It was apparent from the ICM activities that both local governments and scientific institutions benefitted by working together.

Creating an enabling environment for private sector and donor investments

The CSIP and local ICM action plans identified priority programs and activities that required funding from local and national governments, and other interested partners. As a consequence, local corporations and businesses were able to align their corporate social responsibility programs with the priority programs of local governments.

The coordination mechanism established under the ICM program was resilient to changes in political and administrative leadership

Over the 15-year history of ICM in Chonburi, leadership changes at local, provincial, and national levels have occurred during the process of scaling up of ICM practices throughout the entire province. Despite the changes, the existing ICM program was able to continue. The well-structured institutional arrangements were efficient, effective, and continued to receive strong support from local stakeholders. As such, the impacts of political changes were ameliorated.

Thailand's 2015 National Act on Promotion of Marine and Coastal Resources Management mandates the establishment of an interagency and multisectoral coordinating committee for marine and coastal resources management at the provincial and national levels. It provided

an opportunity for Chonburi to further strengthen and institutionalize its existing ICM coordination mechanism, and share experiences with other provinces on how such mechanism could be operationalized.

Recognition for good governance

For Sriracha Municipality, ICM implementation contributed to the achievement of awards recognizing its efforts in development of a healthy and sustainable city. The municipality received national awards for good governance for three consecutive years from 2006 to 2008. Other municipalities in the province have also received various forms of recognition.

Lessons Learned

Timing is important

The ICM concept and practices were introduced in Chonburi when the national government was in the process of implementing decentralization of management responsibilities to the local governments. The introduction of a local environmental management system that could harmonize economic development and environmental conservation proved to be very timely.

Create a shared vision

The development and formal adoption of a vision-led Coastal Strategy, and enactment of a Provincial Order to establish a coordinating mechanism were vital to ensuring wider recognition of the importance and value of the ICM program (Kanchanopas-Barnette, et al., 2012; Khunplome and Wiwekwin, 2008). These were the cornerstones for further development of ICM and its scaling up to the entire province (Box 2).

Box 2. Benefits of ICM implementation to local government members of the ICM network.

An informal survey of mayors/chief executives of 25 coastal and 21 noncoastal local governments in Chonburi conducted in 2015 confirmed their motivation for joining ICM implementation.

All local leaders believed that ICM:

- creates a platform for intermunicipal dialogue and exchange of information;
- provides a platform for cooperation with scientific institutions to respond to scientific questions;
- facilitates connections with international organizations and donors;
- provides an opportunity to participate in international conferences;
- provides local government with visibility in the international sphere; and
- sets a foundation for good governance.

Almost all the local leaders believed that ICM: (a) provides a framework for national government, private sector and donor investments for marine and coastal management; and (b) can strengthen technical, human, and financial resources for addressing sustainable development challenges in the marine and coastal areas.

Many of the local leaders also believed that ICM:

- helps solve multiple use conflicts in the area;
- helps improve political capital by providing a framework for achieving visions of sustainable economic development and environmental protection;
- provides an enabling policy environment for private sector ventures in the area; and
- provides travel and learning opportunities for local government leaders and implementers.

Start small and build

The successful implementation of the coastal strategy in Sriracha Municipality demonstrated the feasibility and effectiveness of the ICM process.

Find a champion

Mr. Chatchai Thimkrajang, former mayor of Sriracha Municipality, continually promoted ICM to other local leaders and areas in Thailand, and was instrumental in developing the ICM network in Chonburi.

Capacity building is a continuing process

Developing human resources and updating scientific and technical capacities to support ICM implementation in Chonburi is facilitated through partnerships with local universities and national agencies, as well as the national and international networks, such as PEMSEA's Network of Local Governments.

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Innovative Scientific and Technological Support System for Coastal Management in Xiamen, PR China

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Key Message

- The effectiveness of scientific and technological support to coastal management can be greatly enhanced through timely provision of critical and reliable information, and techniques or technologies that can be utilized for policy and/or management interventions.
- Incorporating scientific/expert advice into the planning and management processes of an integrated coastal management (ICM) program can improve mutual understanding and enhance cooperation between scientists and managers, increase cost-effectiveness, and generate environmental and socioeconomic benefits.

Abstract

In 1994, Xiamen City was chosen by the GEF/UNDP/IMO Regional Programme for Marine Pollution Prevention and Management of the East Asian Seas Region (MPP-EAS) as a pilot site for demonstrating the feasibility of ICM as an effective approach in achieving sustainable coastal development. Recognizing the important role of science and technology in the design and implementation of management interventions, a Marine Experts Group (MEG) comprising key leaders/representatives from educational, technical, and scientific research institutions in Fujian province was established and incorporated as part of the ICM Coordinating Mechanism; thus, facilitating closer interactions between policymakers/managers and scientists.

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Through the MEG, various scientific and technological support was provided in the process of ICM program development and implementation.

This case study highlights several key scientific and technological support that contributed significantly to: (a) the development and implementation of a marine functional zoning scheme in Xiamen through the application of integrated environmental impact assessment (IEIA) and geographical information system (GIS), in addition to mobilizing multidisciplinary research teams for undertaking field surveys and analysis; (b) application of strategic environmental assessment (SEA) in coastal planning and management interventions; (c) application of numerical modeling to determine the hydrodynamics of the sea areas and the impacts of coastal reclamation resulting in a series of long-term engineering interventions/improvement to restore the water quality of the coastal seas; and (d) the development and implementation of an integrated marine environmental monitoring system (IMEMS) to provide in-situ information on the sea conditions and water quality of the coastal waters.

Key lessons drawn from over 20 years of operation include: (i) the incorporation of a representative scientific community (e.g., MEG) into the standing ICM Coordinating Mechanism greatly enhanced cost-effective policy and management interventions; (ii) the Xiamen experience showcased how scientific and technological support could be effectively mobilized in achieving management objectives; (iii) due to current and new challenges to the sustainable management of the coastal areas, scientific institutions continue to play a proactive role, and as such, MEG continues to function especially for addressing new challenges; and (iv) a long-term IMEMS is an indispensable component of the environmental management system in Xiamen.

Background

In order to achieve effective response to the increasing challenges of climate change and human activities on the sustainable development of the coastal and marine areas, most recent national and international efforts have adopted holistic and ecosystem-based management approaches, requiring the use and integration of scientific information and knowledge as well as utilizing innovative technologies in developing effective science-based management programs (GESAMP, 1996; Hong and Xue, 2002). Since 1994, as one of the demonstration sites of the GEF/UNDP/IMO Regional Programme for Marine Pollution Prevention and Management of the East Asian Seas Region (MPP-EAS), Xiamen has successfully applied the above approaches in the development and implementation of ICM programs (Chua, et al., 1997; Hong and Peng, 2002; McCleave, et al., 2003; Xue and Hong, 2005; Peng, et al., 2006b).

One of the successful experiences of Xiamen ICM was the effective science-management interface through a scientific support mechanism, which facilitated effective utilization of science and technologies for policy and management interventions. Such scientific mechanism was strategically incorporated as a multidisciplinary MEG within the Interagency Coordinating Committee for the development and implementation of the ICM program established since 1994 (Hong and Xue, 2002). The MEG consisted of leaders of various educational and scientific research institutions located in Xiamen City or in Fujian Province. Through the committee, matters concerning the environment and sustainable development were discussed and acted upon. The MEG was therefore able to interact with managers and leaders of various agencies and understand their management challenges so as to provide or mobilize the needed scientific or technological support for facilitating

policy and management decisions. Over the long duration of working together, there was better appreciation of the contribution of science and technology in addressing many of the management challenges.

This case study outlines how scientific and technological support was utilized in policy and management decisions in the development and implementation of some coastal initiatives in Xiamen.

Approach and Methodology

Integrate MEG as an essential component of the ICM institutional mechanism.

In line with the design of the ICM system in developing a science-based management program, MEG was incorporated in the Coordinating Committee. The MEG was responsible for providing scientific and technological advice and expertise in the development and implementation of the ICM program. Its members were familiar with local conditions and management challenges. As such, MEG was able to interact freely with all concerned agencies and other stakeholders in identifying and securing needed information for management interventions.

Identify management needs for scientific and technological support.

By following the structure of the ICM framework and the program development process (PEMSEA, 2006), the ICM project office was able to utilize MEG to undertake information gathering and analysis activities. This step included the preparation of the Xiamen Environmental Profile, State of the Coasts report, coastal zoning, environmental risk assessments, and ecosystem valuation.

With the support of the leadership of the Coordinating Committee, MEG was in a better position to organize the needed field surveys and research investigations. It was also comparatively easier for them to secure the needed financial resources.

Mobilize experts and scientific institutions.

With clear mandates from the Coordinating Committee, MEG was able to select qualified experts from institutions within the province. National or international experts could also be drawn whenever necessary. Such approach enabled MEG to effectively address local concerns. The MEG formed research teams to implement agenda through contractual agreements. As much as possible, technical expertise from each relevant agency was involved throughout the process, thus ensuring close and timely linkage with the scientific teams.

Provide accurate scientific data to support management decisions.

Research teams were responsible for organizing their own protocols, gather primary and secondary information, analyzing available data and submitting their findings to MEG and subsequently to the Coordinating Committee.

Results

ICM is largely area-based and hence, has to address a wide spectrum of socioeconomic and environmental management challenges using various scientific and management tools. The following are examples of key scientific and technological support that were employed for addressing some of the coastal planning and management issues in Xiamen.

Development and implementation of marine functional zoning scheme

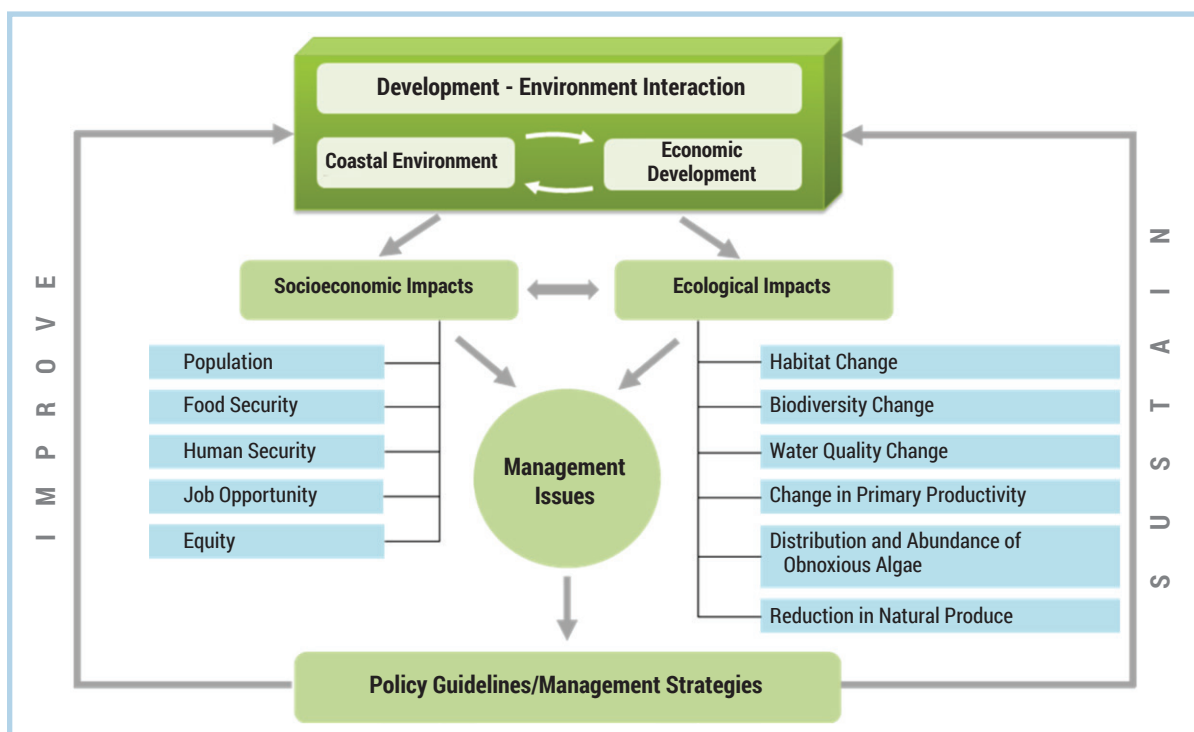
The marine functional zoning (MFZ) scheme was conceived as an arbitrary yet practical approach to reducing use conflicts in the coastal and marine areas by promoting key economic activities in designated areas based on best use of their ecological characteristics (Ruan and Yu, 1999; Dong, et al., 2006; Fang, et al., 2011). Hence, reliable scientific information is necessary to identify coastal areas: (a) essential for conservation and protection of habitats, spawning or nursery grounds of endangered species; (b) suitable for specific dominant economic activities; and (c) suitable for limited but compatible economic activities, etc. The scientific and technological tools used included, among others, IEIA and GIS. These made use of primary and secondary data on the social, economic, and environmental characteristics of the coastal areas. Through careful data analysis, the

ecological functions of the coastal areas and their subsequent zoning scheme could be determined.

IEIA. The IEIA is an advanced technique to identify the nature of the cumulative impacts of economic development and their consequences; prioritize the issues; and provide guidance for the prevention and mitigation of existing and future negative consequences. The incorporation of IEIA in the initial stage of Xiamen's ICM program provided critical inputs for identifying and quantifying overall major environmental and social impacts that could be taken into account in the development of management measures (Xue, et al., 2004).

Based on an IEIA framework developed earlier (Hong and Xue, 1998; Figure 1), the cumulative impacts of the economic development activities in Xiamen waters were identified and mitigation measures suggested. The IEIA is an ecological approach focusing on the physical, chemical,

Figure 1. Framework for assessing ecological and socioeconomic impacts of economic development (After Hong and Xue, 1998).



and biological elements of the coastal ecosystem. Management measures for harmonizing economic development and the coastal environment were then proposed. For example, a series of projects involving reclamation of coastal areas (e.g., filling in wetlands, diking, building dams and other barriers, to exclude coastal waters) were assessed.

The IEIA results showed that the various reclamation activities had negative cumulative and aggregate impacts over time. The overall long-term impacts could accelerate erosion, severe siltation and sedimentation causing blockage of drainage outlets, loss of fish spawning grounds, and hindrance to navigational passage (Xue, et al., 2004). Suggested mitigation measures were: (a) widening of the sluice gates of Maluan Dike; (b) developing a numerical model to predict water alteration; (c) controlling reclamation practices; (d) increasing sewage treatment control; and (e) implementing a functional zonation scheme to regulate economic activities.

Establishing MFZ scheme. Although understanding and assessing the cumulative environmental and social impacts are a challenge to the scientific community, mitigating such

cumulative impacts can be even more so for the economic and environmental managers. In addressing these challenges, it was important to note that these challenges arise not only from the overexploitation of natural resources, increasing population, and/or pollutant discharges, but also from conflicting multiple uses between sectors and inadequate management measures (Chua, et al., 1997). Hence, the development and implementation of coastal zoning presented a useful option to identify and address unregulated activities in the coastal areas.

The Xiamen MFZ scheme was initiated in 1997 by way of an administrative order designated to promote rational development and utilization of marine resources and contribute to the resolution of multiple use conflicts (Chua, 2006). It was implemented within the sector programs and mandates of the 23 line agencies of the government. The basis for designating primary, compatible or limited functions of each zone was largely based on careful consideration of: (a) existing uses; (b) ecological characteristics; (c) environmental risk analysis; and (d) socioeconomic consequences. Involvement of line agencies and stakeholders' consultation were prerequisites (Box 1).

Box 1. MFZ scheme.

- The Xiamen MFZ scheme (Figure 2) defined the dominant (use high priority), compatible (maximum benefit for multi-resource uses), and restricted functions of each sea area.
- Prioritization was determined based on the estimated socioeconomic benefits and related environmental impacts of the uses under the assessments of the cumulative effects of current and potential activities in Xiamen's marine areas.
- The direct result of the zoning scheme was:
 - (1) The removal of the flourishing aquaculture practice in the East Sea areas and its replacement as a tourism and recreational zone; and
 - (2) The integrated management of the West Sea areas including the removal of aquaculture practices in place of a shipping zone and conservation site for endangered species.
- These initiatives turned around Xiamen's disorderly marine management practices, not only in terms of ecosystem conservation and restoration but also an orderly relocation of sea use based on ecosystem functions.

GIS for MFZ scheme implementation. In May 1999, an IIMS was completed by experts from Xiamen University. GIS software was used to map the sea and land areas of Xiamen, providing visual information that improved the development and implementation of the functional sea use zonation scheme. The utilization of the high-precision GPS and application of the satellite remote sensing helped to secure information and monitor sea conditions and changes in the marine environment. These technologies, in a way, helped the city government to constantly improve the precision of the zonation scheme (PEMSEA, 2006). With a scale of 1:5,000, the GIS system enabled the effective operation of MFZ.

Furthermore, based on MFZ, a market-based instrument in the form of permit user fee scheme

was enacted through two sets of legislation: (a) the Regulations on the Protection and Management of the Marine Environment; and (b) the Xiamen Marine Use Fee System. The relatively high fees imposed dissuaded incompatible activities in the location where they were applied, controlling access to and exploitation of resources (Chua, 2006). In order to evaluate the fees for different types of marine special usage, two separate models were developed to estimate the price of marine spaces, based on production factors and environmental capacity recourses, respectively. For example, the user of reclaimed sea areas would not only pay the usage charge but also the ecological damage cost (Peng, et al., 2006a).

A management system for Xiamen sea areas and islands (Figure 3) integrating MFZ, coastlines,

Figure 2. Xiamen MFZ scheme (Fang, et al., 2011).

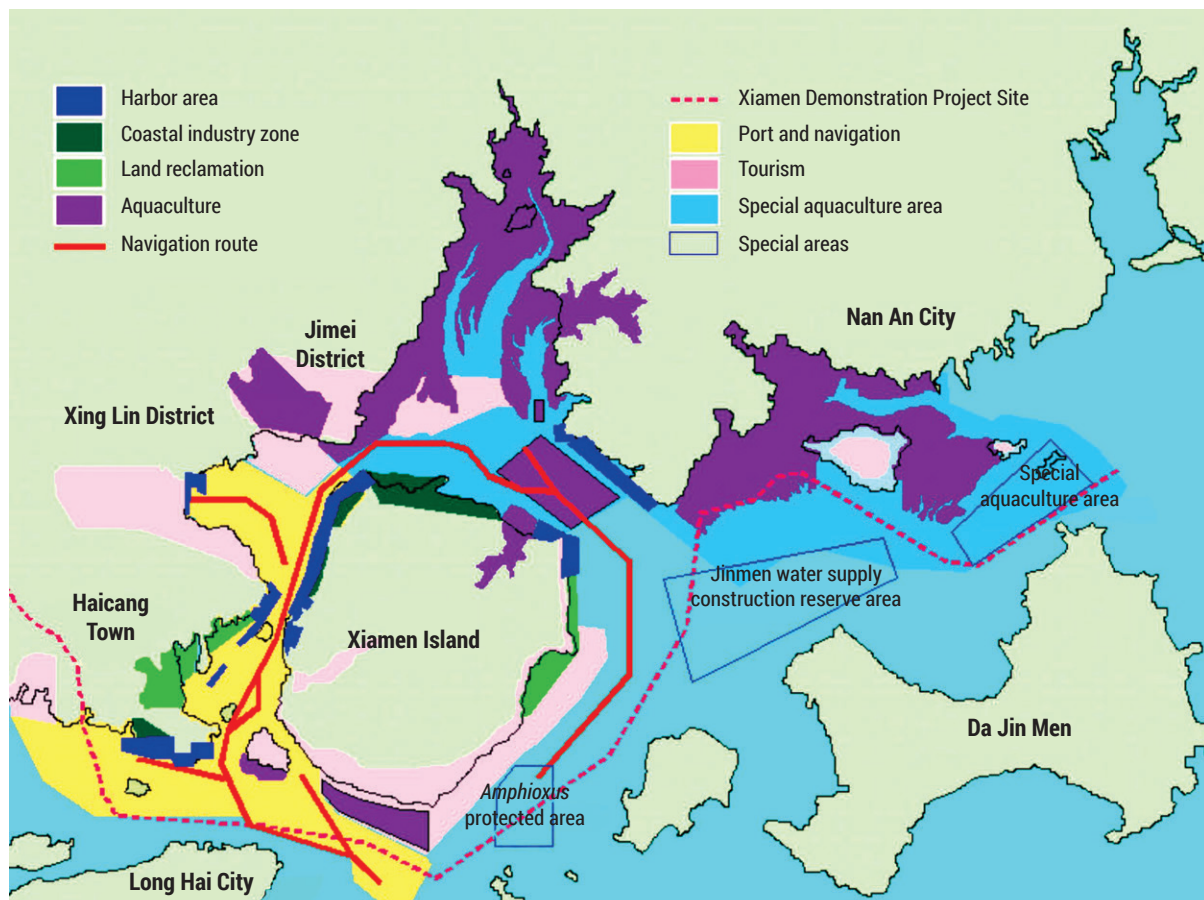
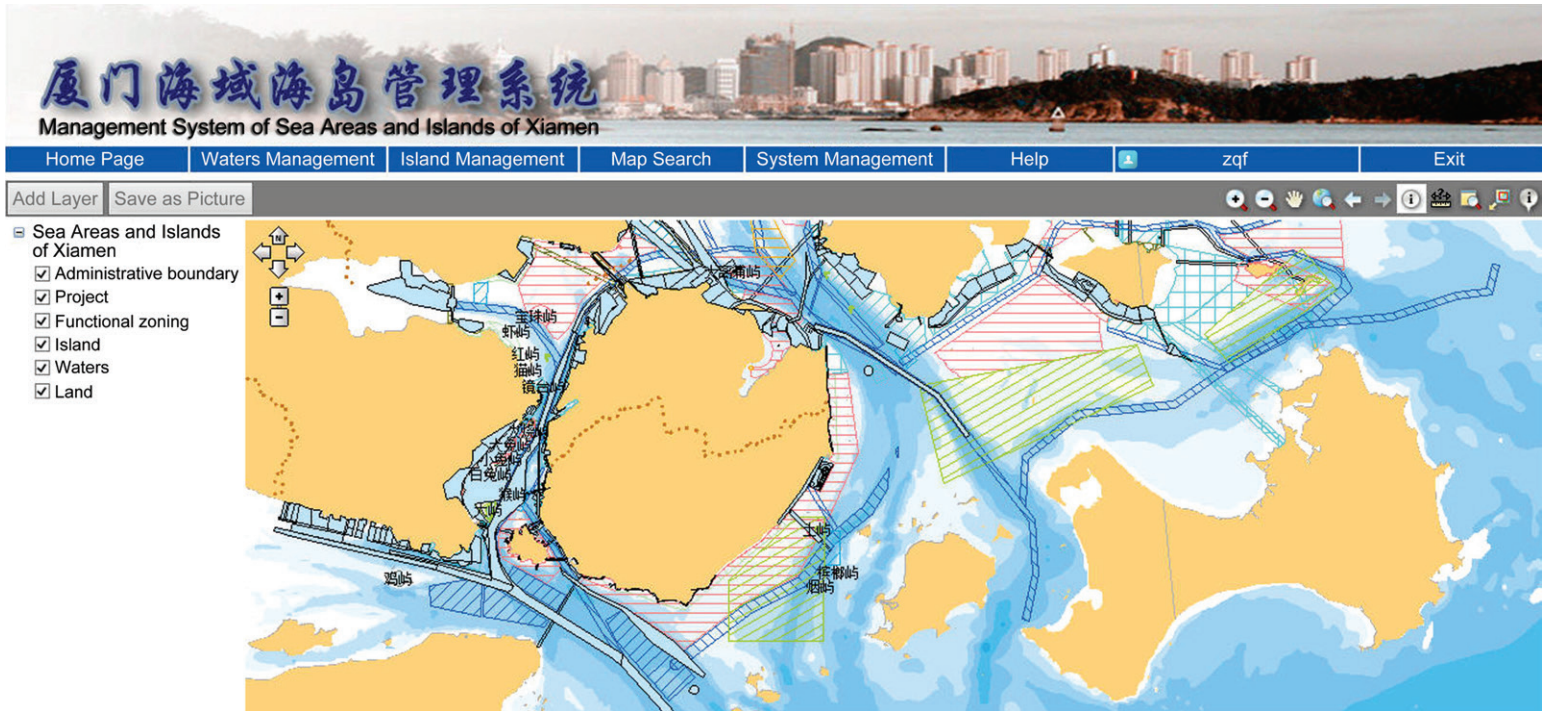


Figure 3. Management system of seas areas and islands of Xiamen.

and permit-fee schemes and user fee schemes was an effective tool for management of sea area uses. The system covered issuance of permits, zoning scheme compliance and enforcement, and avoidance of overlaps among primary sea uses.

Strategic environmental assessment of the development plan

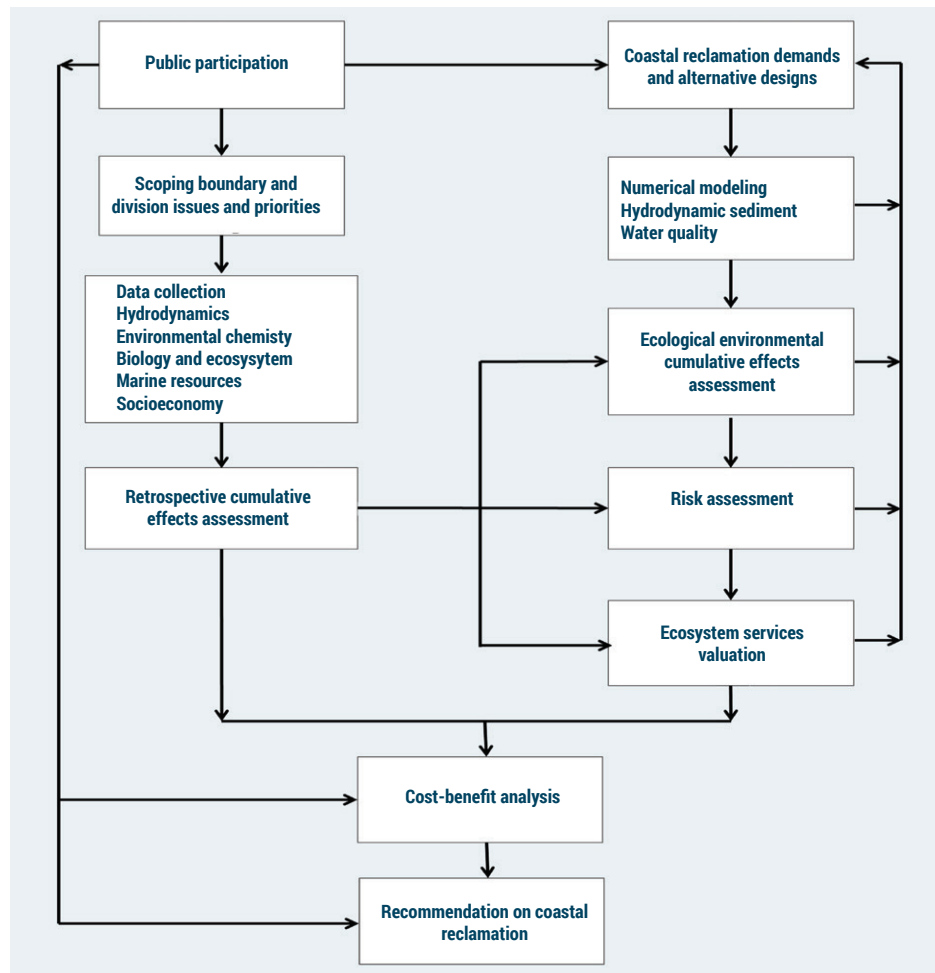
A strategic environmental assessment (SEA) of the reclamation plan was conducted to strictly regulate coastal reclamation projects with the procedure shown in Figure 4 (Fang, et al., 2009). From the assessment results of the reclamation plan, permitted or nonpermitted areas for reclamation or areas requiring cautious and strict control with respect to EIA recommendations were identified. Hence, demands for coastal reclamation projects were subject to careful evaluation of the ecological risks and socioeconomic benefits before any reclamation could be approved, thus underscoring the important role of science in decisionmaking.

Restoring coastal environments

Since the 1950s, large-scale coastal reclamation and dike constructions were permitted in Xiamen bay and coastal area. These works, especially in the western and eastern sea areas altered the hydrodynamic conditions and caused water quality deterioration as a result of restricted waterflow and exchange (Hong and Wang, 2009).

A two-way nested-grid numerical model was developed by Xiamen University to study the general hydrodynamic indexes of the western and eastern seas in Xiamen Bay and analyze the accumulative effects of coastal reclamation activities covering the period 1938–2007. The model was developed based on the Princeton Ocean Model (POM). Modeling results showed that the average tidal velocity and tidal flow capacity decreased by about 40% and 20%, respectively, compared to that of 1938. The study also estimated the level of hydrodynamic improvement that could be attained from the implementation of environment restoration projects. Based on the

Figure 4. SEA procedure (Fang, et al., 2009).



high linear correlation between tidal area and hydrodynamic indexes, the model forecasted that the hydrodynamic status could return to the 1972 conditions through the interventions of restoration projects (Hong and Wang, 2009).

Based on the above scientific findings, a series of environmental restoration projects were proposed by the experts as follows:

1. Open the Gaoji dike with an 800 m bridge in order to enhance the water exchange between West and East seas.
2. Open Maluan dike, Xinglin dike, and Dongkeng dike by 200 m, 250 m, and 700 m, respectively.

This would improve the hydrodynamic condition in Xiamen Bay.

3. Dredge the deposited sediments in West and East seas to the level of low slack tide, which would increase the tidal prism and hydrodynamic condition.
4. All aquaculture activities should be removed from Xiamen Bay and sewage from residences and industries should be collected and treated to achieve the allowable standard water quality before flushing out.

The Xiamen City government accepted the experts' proposal and implemented a series of environmental restoration projects including

sea area desilting, opening up bays by means of transforming causeways into bridges, or constructing gates to facilitate waterflow. The demolition of the Dadeng causeway contributed to improving the hydrodynamic conditions of the eastern and western sea areas. The Zhongzhai causeway as well as the transformation of Jixing causeway with water gates were also completed while the openings of Gaoji causeway and Maluan causeway are still in progress.

Hence, the opening of causeways, when fully completed and the desilting of sea areas around them, will result in the flushing out of pollutants from the West Sea area. The water quality of East and West Sea areas is expected to improve. The opening of the Jixing Causeway is expected to minimize the flood control recurrence period from the current 10-year to a 50-year interval. Meanwhile, the opening of the Gaoji causeway can restore the connection between East and West Sea areas by improving the daily water exchange of 71 million m³ and reducing the water exchange cycle to two days.

These restoration projects dramatically improved the ecological environment of Xiamen's seas, maintained the marine ecological balance, restored marine resources, improved the marine landscape, and thus contributed to boosting port development, shipping transportation, coastal tourism, coastal industries, and other emerging high-tech marine industries. These leading marine industries contributed more than 60% of the added value to the marine economy and accounted for 80% of Xiamen's coastal economy. The added value to the marine economy was estimated at US\$ 14.71 million per km².

The ecological, social, and environmental benefits achieved through the above environmental improvement projects demonstrated that the ocean can regulate its own functions given ample assistance to enable its recovery.

Integrated marine environmental monitoring system

A sustained and integrated environmental monitoring system acquires and disseminates data and information to serve policy, management, and other specific needs of many user groups (government agencies, industries, scientists, educators, NGOs, and the public). This can be achieved by linking in-situ observations to a system of data management and analysis that will generate timely information on the status of the environmental condition of a given area.

An integrated marine environmental monitoring system (IMEMS) was established by incorporating the routine sampling stations and buoys (YSI and LOBO) deployed by various concerned agencies in Xiamen Bay. An array of buoys with precise instruments was installed in the bay to enhance the monitoring capacity for obtaining multiple real-time in situ data covering meteorological, oceanographic, and ecological parameters (Figure 5).

In order to provide the high-quality data to ensure sustainable management of Xiamen's coastal areas, a Xiamen Marine Monitoring and Information Services Platform (MIS) was established with the joint efforts of the Southern Ocean Research Center of Xiamen University and the Xiamen Oceans and Fisheries Bureau. Through this platform, collaboration between scientists and managers was greatly enhanced with effective use of information arising from the monitoring devices, numerical models, remote sensing, and GIS applications technology.

With this platform, relevant information was readily utilized for supporting ocean engineering projects, disasters prevention, fishery management, pollution control, and habitat management, as well as for monitoring long-term coastal changes.

Figure 5. The marine monitoring and information services platform (MIS).



Lessons Learned and Suggestions for Future Development

1. The MEG, since its formation nearly 20 years ago, has been generally recognized as a good consultative mechanism whereby scientific views and advice were seriously considered in policy and decisionmaking. It enabled continuous communication and working relationship among scientists, policymakers, and managers. It facilitated institutional collaboration among sectors resulting in increased local government support and ICM application (Xue and Hong, 2005; PEMSEA, 2006). Through MEG, applied and problem-
2. Xiamen's experience in the utilization of scientific research results and innovative technologies (e.g., IEIA techniques, MFZ, GIS, numerical modeling, IMEMS, etc.) was a showcase on how science and technology could help to ensure environmental quality in the context of increasing development pressure and global climate change.
3. Like other coastal cities, Xiamen has to prepare itself to face the increasing impacts of climate

oriented research were able to make positive contributions and provide relevant knowledge to coastal managers to respond more effectively to the changing environmental conditions. As such, effective utilization of such mechanism should be sustained.

change, unsustainable economic development, and population growth. It is therefore critical to draw upon the collective wisdom, experiences, and human resources towards developing appropriate mitigating measures. Toward this end, coastal leaders might wish to make full use of the expertise of natural and social scientists as well as engineers in providing technical solutions and listen to their advice before making policy and management decisions. It might also be necessary for the scientific community to better understand the needs and responsibilities of the policy and decisionmakers and strive to provide appropriate technical advice or solutions that can be easily understood by them. Thus, there is this urgent need to increase local capacity in coastal governance and management (Hong and Xue, 2006). The efforts of PEMSEA to identify and mobilize key institutions involved in ICM into a Network of Learning Institutions for ICM Development might be worth greater attention and investment.

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Reducing Use Conflicts through Marine Functional Zoning

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Key Message

- Marine functional zoning (MFZ) as developed and implemented in the Xiamen Sea areas has proven to be an effective management tool in minimizing multiple use conflicts in coastal waters.
- Appropriate legislative measures were imperative to ensure compliance, although stakeholders' support and participation were also necessary.
- The sea use permit system also helped to generate substantial financial resources for strengthening and sustaining management measures.

Abstract

Sea use conflicts have become a significant management challenge for sustainable utilization of resources in coastal waters worldwide. In order to reduce multiple use conflicts in coastal waters and harmonize human use and nature conservation, a MFZ scheme was developed and implemented in Xiamen as a pilot marine spatial planning practice in China. The positive outcomes of the implementation of MFZ showed that the environmental quality of Xiamen's sea areas

remained stable and the endangered marine species were protected despite rapid growth of coastal population and marine economic development. This case study outlines the process of developing and implementing MFZ in Xiamen coastal waters, the outcomes, and the lessons learned.

Background

Xiamen is a coastal city located at the southeast coast of Fujian Province, PR China, facing the Taiwan Strait. The city is also sited at the mouth of the Jiulong River. Xiamen has a land and sea area of 1,699 km² and 390 km², respectively, and 234 km of coastline.

As one of the four designated Special Economic Zones of PR China, Xiamen has experienced rapid economic development with an average GDP growth of 17.8% per year since 1980. However, the population increased dramatically, reaching 4 million by 2013. As a harbor city and also a popular coastal tourism destination, Xiamen relied heavily on its coastal and marine resources for its economic development. In 2013, the revenues from the marine sector reached RMB 36 billion (US\$ 6 billion) accounting for 13% of its total GDP. Nevertheless, the

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environmental quality was maintained in a stable condition despite increasing population and scale of economic development.

The ability of Xiamen to maintain a balanced development in terms of environmental protection and the economy did not happen naturally. It was the outcome of Xiamen's long-term efforts to resolve conflicts associated with population increase, environmental protection, and economic sustainability since the last quarter of 1990.

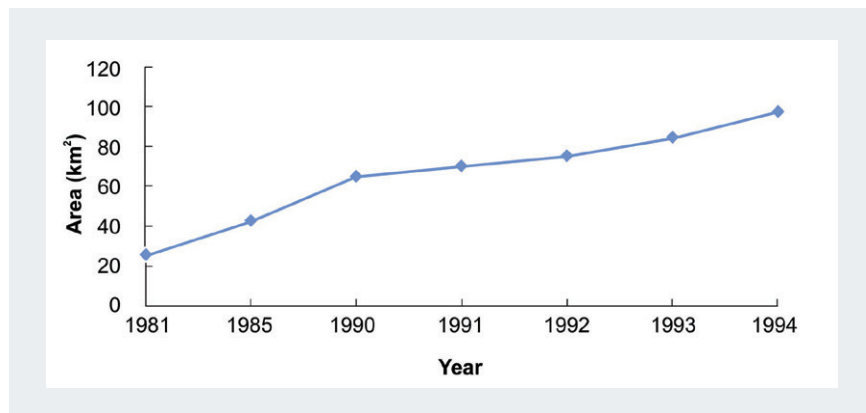
When Xiamen became one of the four Special Economic Zones in 1984, the special status brought about a variety of economic activities that involved different levels of coastal and marine resource exploitation and utilization. Although the local economy ballooned in the short term, it also brought a wide-range of environmental and social challenges. There were severe impacts of coastal water pollution and rapid increase of uncontrolled fish farming practices (such as raft and cage culture) in the western and eastern sea areas. The wastes from aquaculture farms and discharges of untreated industrial and domestic wastes heavily contaminated the coastal waters around Xiamen, damaged ecosystems, and caused the decline of marine biodiversity (PEMSEA, 2006). For example, the total amount of chemical oxygen demand (COD) in the Western Sea in 1998 was reported at 11,664 tons, causing

eutrophication and algal blooms, which in turn resulted in the loss of 1,000 tons of cultured fish in cages in the Maluan Bay area (Xu, et al., 1998; Zhang, 2001). Due to deteriorating environmental quality, the annual fish catch per unit effort using gill net, fixed net, and trawl in 1995 also dropped by 64.79% compared to that in 1984 (Lu, et al., 1998). The hundreds of unregulated aquaculture farms consequently blocked navigational channels, seriously affected navigation and vessel traffic as well as hampered needed port development activities (Figure 1).

Institutional and sectoral conflicts were another set of management challenges. There were up to 15 ocean-related agencies and departments in the 1990s with jurisdiction over Xiamen's sea areas under the city and national governments. However, there was a general lack of institutional/sectoral cooperation and coordination. Many agencies and departments had overlapping functions, resulting in waste of resources and increase of management costs (PEMSEA, 2006).

The realization to mitigate the aforementioned problems brought about the need and urgency to harmonize multiple uses in the coastal waters of Xiamen through adequate, long-term sea use planning and integrated management to ensure orderly and sustainable economic development for the rapidly developing city.

Figure 1. Aquaculture areas in Xiamen Sea area (Xu, et al., 1998).



Approach and Methodology

In 1994, Xiamen City government began to implement an Integrated Coastal Management (ICM) Demonstration Project under the GEF/UNDP/IMO-funded Regional Project for the Prevention and Management of Marine Pollution in the East Asian Seas. The purpose was to demonstrate the effectiveness of the concept and practice of the ICM program in protecting the marine environment in the Xiamen sea areas towards achieving the goals of sustainable development (Zhou and Lu, 2006).

In 1997, a sea use zoning scheme, commonly known as marine functional zoning (MFZ) in China, was developed. The MFZ refers to classifying the sea areas and islands into different functional zones with different use types and environment quality requirements, based on marine resources status, current economic development status, and environmental and ecological characteristics, while considering sustainable economic and social development (Fang, et al., 2011). The MFZ remained a concept for several years but was first tested in Xiamen. Its operational procedures were verified and improved.

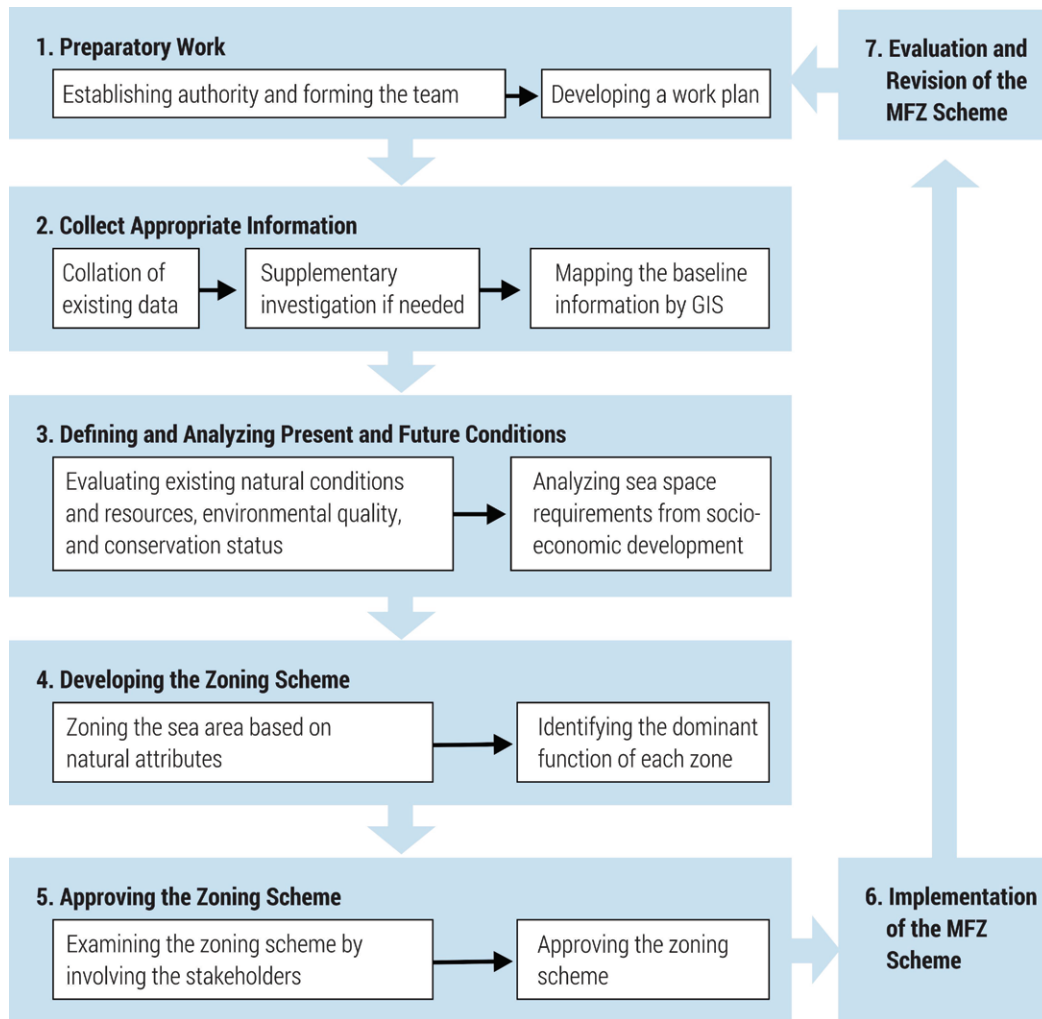
The objectives of MFZ are to effectively address multiple use conflicts as well as those arising from sea uses and marine environmental protection to achieve maximum net social and economic benefits and long-term stability of the marine environment and biodiversity conservation (PEMSEA, 2006). Specifically, MFZ aimed to address conflicts of different functions and transboundary effects of sea uses, coordinate exclusive demands on sea areas, and existing and future uses (Lu, et al., 2015). In other words, MFZ is designed to ensure orderly, rational, and efficient uses of the coastal/sea resources.

The operational process of MFZ in Xiamen included both technical and management aspects.

The technical aspects included classifying various sea uses and dividing sea areas into zones based on their dominant, compatible, and restricted (limited) functions. The management aspects included consultation with and participation of all stakeholders during the preparation and finalization of the functional zoning schedules before submission for approval to the government.

The Technical Directives for Marine Functional Zoning issued in 2006 proposed an overall working procedure summarized in seven steps as indicated in Figure 2 (Fang, et al., 2011).

In the case study of Xiamen, a lead group under the Xiamen City government was established for organizing and supervising the overall work of developing the MFZ scheme. An advisory body consisting of experts from ocean-related disciplines was also established to provide technical advice (i.e., Marine Experts Group, MEG). A working team, consisting of professional technical staff and representatives from relevant departments, was formed to develop work plans. Then, data were gathered, including oceanographic and other natural environmental features, ocean-related activities, status of marine resources as well as socioeconomic conditions in adjacent land areas. In cases where relevant data were not available, supplementary investigation was conducted. Based on the collected data, the prevailing conditions, including marine hydrological and ecological characteristics, marine resources, environmental quality, and the conservation status, were analyzed and mapped in GIS. Future sea space requirements arising from future marine economic development were also analyzed. The functions of each zone were identified largely based on natural attributes of sea areas and sea use demands. A draft zoning scheme was developed, reviewed, and revised by experts in consultation with other stakeholders, before being submitted to and approved by the city government.

Figure 2. Process for the development of MFZ scheme (Fang et al., 2011).

Results

To date, Xiamen has implemented four ICM program cycles (PEMSEA, 2006, 2009). The first program cycle achieved significant outcomes in terms of wastewater treatment and marine pollution abatement. A sea use functional zoning scheme was developed and implemented during the second ICM program cycle to verify its effectiveness in resolving multiple use conflicts in Xiamen coastal sea areas.

With the support of the Xiamen MEG, which is attached to the Coordinating Mechanism for the implementation of ICM program, the Xiamen City government initiated the implementation of its first

MFZ in 1997. The sea use types in Xiamen were classified into ten categories (with 33 subcategories) according to the types and characteristics of sea uses and natural resources. The sea areas around Xiamen were divided into four major geographical zones: the Western Sea area, the Tongan Bay area, the Eastern Sea area, and the Dadeng Sea area. Each of the sea areas was zoned to various uses, which were separately identified as dominant, compatible, controlled, and conservation or restricted functions. Based on the analysis, the dominant function of the Western Sea area was identified for port and transportation development, while that of the Eastern Sea area was for tourism development. The aquaculture farms in these two areas were transferred to Tongan Bay area and Dadeng Sea

area. Figure 3 indicates the results of the zoning scheme in 1997.

The MFZ scheme could be adjusted according to prevailing development needs but without sacrificing environmental integrity. With the adjustment of economic structure to include emerging new marine industries, the Xiamen City government made revisions to its zoning scheme. The latest scheme was revised in 2012. The government issued several regulations such as the Regulation on the Sea Area Use and Management to ensure compliance with and implementation of the formulated zoning scheme.

With the implementation of the MFZ, the most significant outcome was the reduction of sea use conflicts, thereby ensuring orderly use of the sea areas. For example, the number of deepwater berths

increased from 11 in 1995 to 248 by 2013, and the total cargo handling capacity of the port reached 191 million tons against 13.13 million tons in 1995 (Du, 1996). Besides these, the functional zoning scheme also accommodated the development of emerging uses such as the sailing industry, with a potential GDP contribution estimated at RMB 6.5 billion (US\$ 1 billion).

In terms of marine environmental quality, monitoring results show that COD concentration remained stable while GDP increased sharply (Figure 4). As regard to protecting endangered species, an obvious improvement was the increased visibility of the Chinese white dolphins after a national marine protected area in the Western Sea area was set up in 1999. Field monitoring data indicated that the population of these dolphins

Figure 3. Xiamen MFZ scheme in 1997.

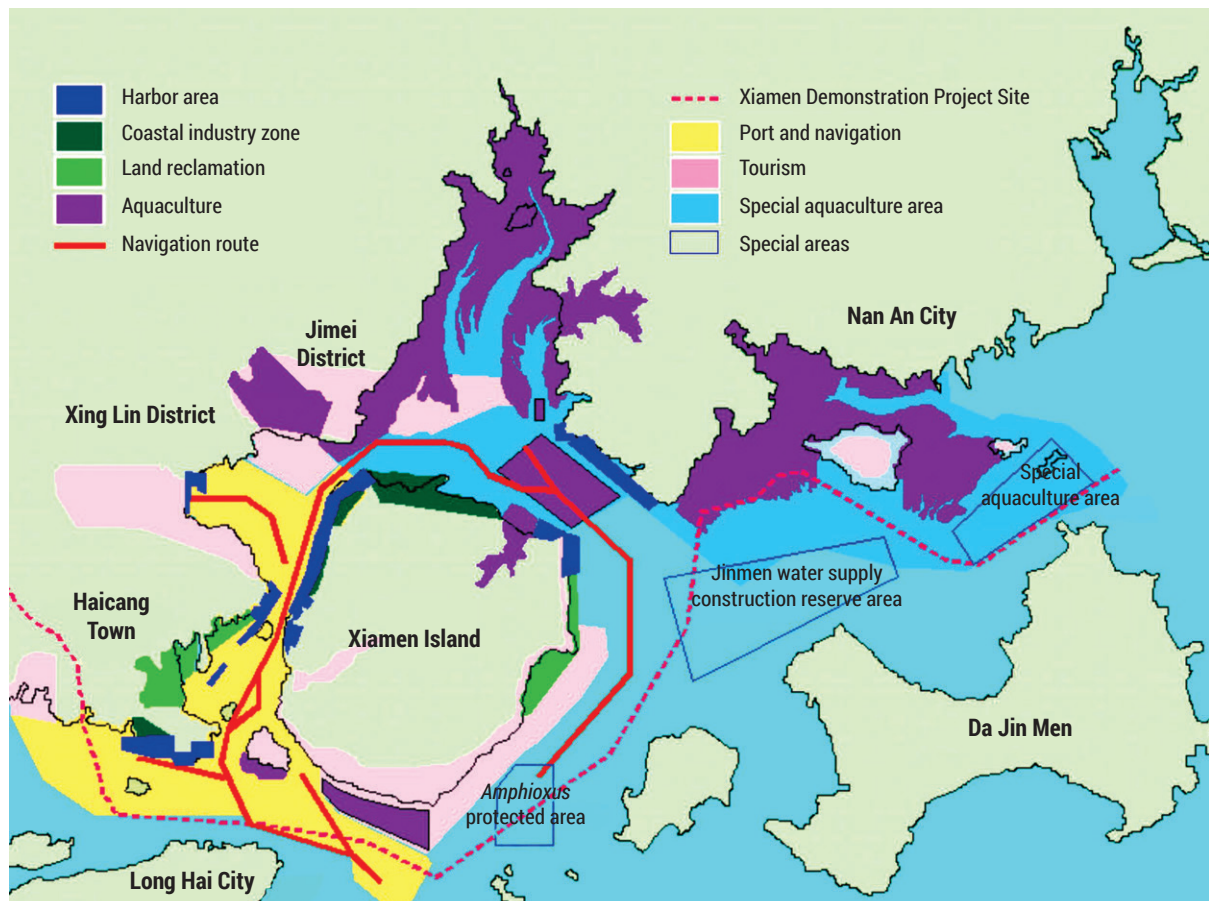
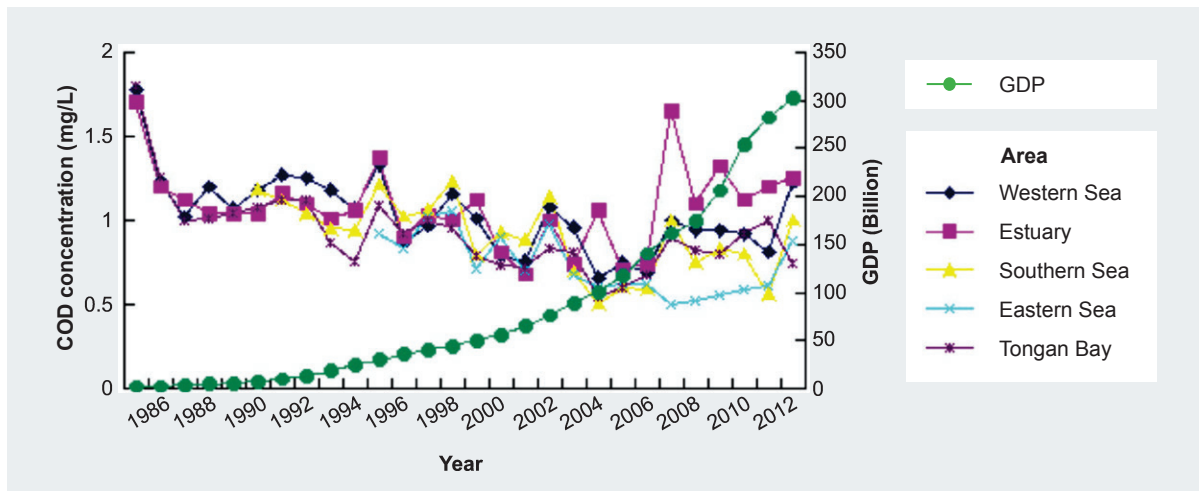


Figure 4. The trend of COD concentration in Xiamen Sea area and of GDP of Xiamen (Zhang, et al., 2013).



remained steady in recent years (Figure 5). The young population increased from 9.75% in 2003 to 26.2% in 2010 (XOFB, 2010; Huang, 2012).

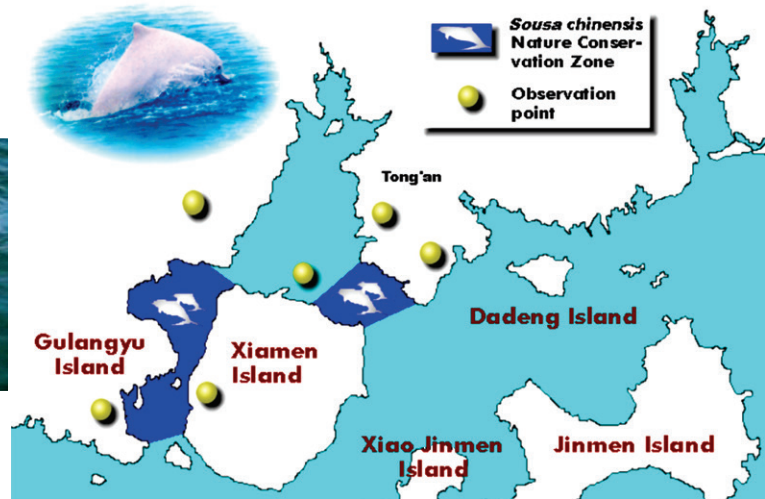
Lessons Learned

1. *The MFZ is an important governance tool.*

The MFZ in Xiamen was a successful showcase in moving ICM conceptual framework into a concrete practice. Sea use management including MFZ was the major element of Xiamen ICM governance framework because the process of implementing MFZ was fully embodied in the key components of ICM system. To ensure effectiveness, the Xiamen City government enacted legal instruments to support compliance and enforcement of the approved zoning scheme. Such instruments formed the basis for the successful implementation of the integrated law enforcement operations by concerned agencies and departments in Xiamen. Key governance and management elements of ICM were also reflected through the development and implementation of the MFZ including interagency coordination, policy integration, public awareness, stakeholders' participation, and application of science.

2. *The MFZ lays the foundation for the development of a blue economy.* The development of a blue economy requires a thoughtful balance between a thriving economy and the dynamics of the marine ecosystem with due consideration to present and future needs. In actual fact, MFZ was a form of a marine spatial planning (Douve, 2008) which enabled effective and sustainable use of marine space and resource therein. This scheme maximizes ecological potential as well as designated areas that ensured protection and conservation of endangered species.
3. *The MFZ is effective in conservation and enhancement of environmental quality.* Since implementing MFZ, the marine environmental quality of the sea areas remained stable and endangered wild species, such as Chinese white dolphins and egrets, were protected (Jiang and Fang, 2015), without hampering the designated sea space for economic development.
4. *Implementation of MFZ can generate financial resources for supporting management measures.* Xiamen was able to issue sea use permits to various marine users operating within Xiamen sea areas. In 2011, the total sea area covered was 2.23 million m² and sea use fees collected amounted to RMB 27

Figure 5. Chinese white dolphins (*Sousa chinensis*) nature conservation zone.



million (US\$ 4.2 million) (XOFB, 2011). The huge amount of revenue constituted the main financial resources of the city for undertaking marine management measures.

5. ***Involving stakeholders in the revision of subsequent zoning schemes.*** Recognizing the significance of stakeholders' participation, the Xiamen City government involved those from sea use sectors and marine industries, as well as local scientists and conservationists in the revision of subsequent MFZ schemes.
6. ***Xiamen provides a good example of local practice for scaling up MFZ.*** The MFZ implementation in Xiamen demonstrated its effectiveness in regulating the use of sea areas, protecting the marine environment, and promoting the rational and sustainable use of marine resources. The experience in Xiamen has contributed to the upscaling of MFZ throughout the coastline of PR China. The national Law on the Management of Sea Uses in 2001 mandated that all uses of sea areas in the country should comply with approved MFZ schemes. Thus, MFZ became the basis for marine development planning, marine resource management, and establishment of marine nature reserves (Ge, 2001; Lu and Ai, 2001; Guan and Wang, 2002). Consequently, MFZ in

PR China covered four scales of operation at national, provincial/municipal, city, and county levels. Xiamen was a pioneer local government in implementing MFZ at the city level. Its success in MFZ provided a good working methodology and experience for other coastal cities/municipalities in formulating functional zoning schemes.

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Marine Protected Area Networking in the Center of the World's Marine Shorefish Biodiversity Abundance: Verde Island Passage Marine Corridor

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Key Message

- Effectively managed marine protected area (MPA) sites and networks yield optimal ecological and socioeconomic benefits. Not only do the networks help in the recovery of fisheries, but they also meet other environment and human needs such as maintenance of coastal water quality, shoreline protection, and increased opportunities in livelihood and tourism.
- MPA sites and networks can successfully raise the awareness, vigilance, and participation among local communities in the network. Instead of tension and resentment toward conservation programs, MPA sites and networks are able to secure the support of primary stakeholders, i.e., the communities. In Batangas, greater appreciation was observed among local fishers on the significance and direct benefits of MPAs in their locality, the linkages between MPAs of adjacent municipalities and fishing grounds, and the necessity to protect areas beyond their jurisdiction. The strict enforcement of local ordinances and fishery laws lessened the incidence of illegal fishing.
- The Batangas MPA network proved to be an effective management mechanism that can be scaled up for broader coverage of the Verde Island Passage Marine Corridor, the main center of the world's marine shorefish biodiversity.
- Collaboration between donors and international organizations greatly enhanced management efforts in addressing environmental and other sustainable challenges.
- The ICM program contributed to a successful and sustainable MPA network.

Abstract

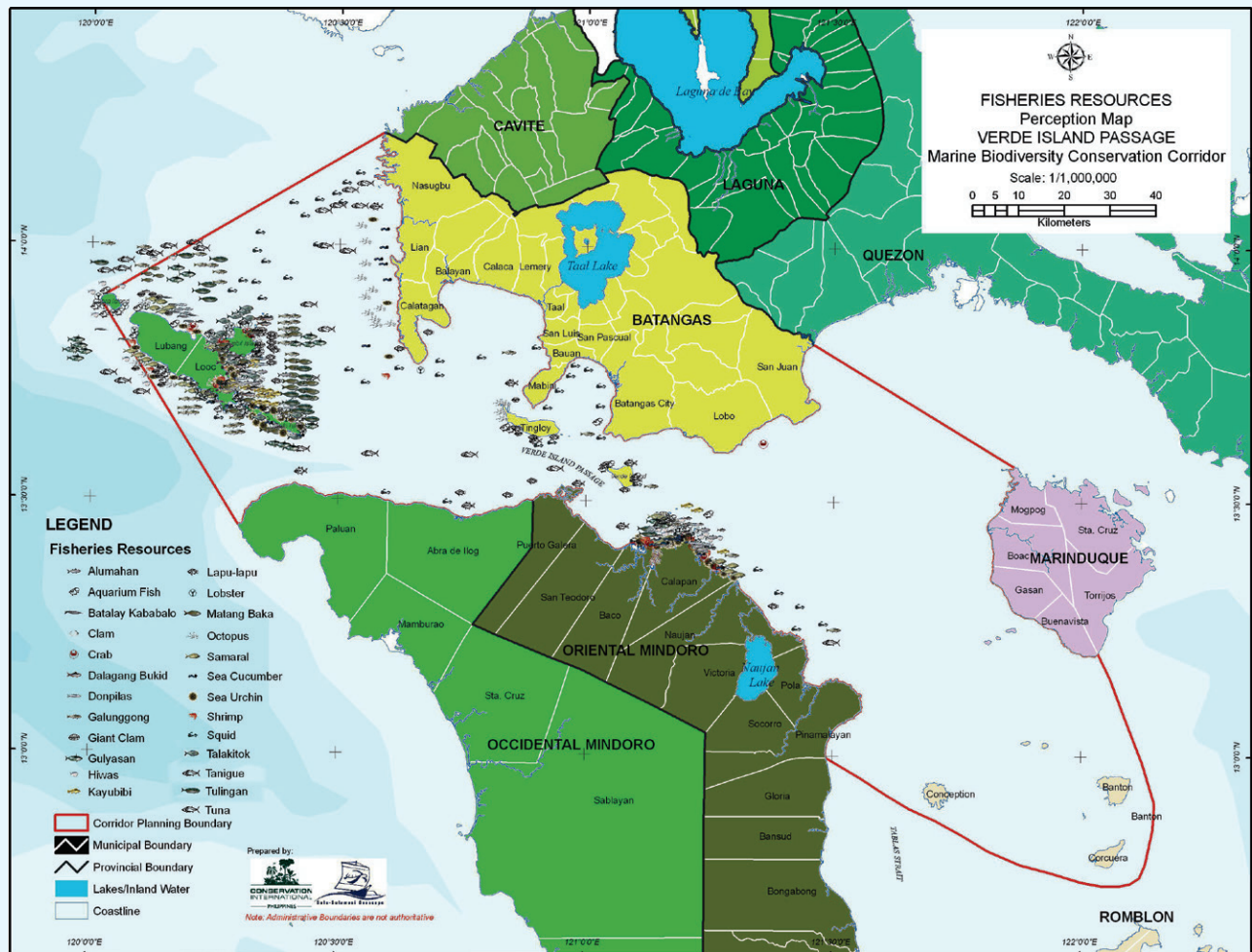
The Philippines is known for being one of the world's centers of marine biodiversity (Roberts, et al., 2002; Carpenter and Springer, 2005; Box 1). However, climate threats and human activities were constantly endangering its marine resources like fishing overcapacity and destructive fishing practices (Cabral, et al., 2014). In order to protect the coastal habitats, conserve biodiversity, sustain the fisheries resources, and improve the livelihood

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Box 1. Verde Island Passage Marine Corridor.

The Verde Island Passage Marine Corridor is situated between Southern Luzon (Batangas) and Mindoro. It is about 100 km long and only about 20 km across at its narrowest point. The channel is relatively deep with maximum bathymetry of about 1,000 m along the northwest coast of Mindoro (Figure 1).

Figure 1. Fisheries Perception Map of the Verde Island Passage Marine Biodiversity Conservation Corridor.



The South China Sea and Pacific Ocean waters also converge and probably exchange properties within this passage bringing nutrients that sustain the more than 300 species of corals that host nearly 60% of the world's known shorefish species (Carpenter and Springer, 2005). Because of its high marine biodiversity, Verde Passage has been placed at the peak of the "Coral Triangle" that spans the Sulawesi and Sulu Seas and nearby Indonesia. Verde Passage is a vital corridor for marine-based tourism, transportation and international shipping, the conservation efforts have been focused on this important waterway.

The Batangas MPA network is a significant portion of the Verde Island Passage (VIP) MPA network, which is possibly the only network in the Philippines to have biological and social components dedicated for MPA and enforcement initiatives. In fact, the Verde Island Passage marine biodiversity conservation corridor has 36 MPAs – 24 of which are in Batangas and 12 in Oriental Mindoro (Quibilan, et al., 2008).

of coastal communities, the establishment of MPAs and MPA networks in various regions of the country was initiated.

Over the last 20 years, the Province of Batangas showed significant progress in expanding its management strategies for the sustainable development of the coastal and marine areas. This started in 1994, in partnership with PEMSEA, in Batangas Bay wherein the ICM system was demonstrated. The province developed a 15-year Strategic Environmental Management Plan (SEMP) (2005–2020), which was updated to include three action plans, namely habitat restoration and management, water resource protection and management, and fisheries protection and management.

Several approaches were adopted by the concerned municipal governments to more effectively address the above coastal and marine resource development challenges:

- MPAs and MPA networks were identified using scientific criteria;
- The Batangas MPA and a management mechanism composed of various relevant agencies and institutions from the government, NGO, and academe were formally established to support MPA management. The MPA Network was established through a Memorandum of Agreement for collaborative work at the local, regional, and national levels;
- A short-term MPA management plan was developed with targeted goals and actions in accordance with the characteristics of each MPA of the network;
- Public education, communication, and awareness-building programs were implemented and sustained for the stakeholders involved in MPAs;
- The impacts and benefits derived from the MPA network were monitored, assessed, and reported,

and an annual biophysical and socioeconomic monitoring and assessment were conducted to check the health of the marine ecosystem;

- A Recognition Awards Scheme for MPA plans and their implementation to generate sustained interest within the network was organized; and
- Regular and deputized patrols were conducted against MPA violators. All these actions resulted in the increase in both size and number of MPAs and continued financial support.

Background

The establishment and effective management of MPAs is one of the most effective means of protecting marine and coastal biodiversity (IUCN, 2010). While the Philippines is one of the world's centers of marine biodiversity, its marine resources are constantly endangered by climate threats and unregulated human activities, such as overfishing and destructive fishing practices; increased domestic, agricultural, and industrial runoff from a fast growing population; poor land use; and increased sedimentation from watershed deforestation and unregulated mining activities (Cabral, et al., 2014).

To address these challenges, the country's national and local governments established MPAs and MPA networks in various regions, mainly to protect coastal habitats, conserve biodiversity, sustain fisheries resources, and improve livelihoods of coastal communities and fishers.

According to IUCN (2010), MPAs play an important role in replenishing biodiversity and contributing to human well-being. For example: (a) "no-take" MPAs quickly double the amount and size of fish; (b) they serve as safe breeding grounds for threatened species while protecting a variety of marine ecosystems, and sustaining the rich biodiversity; and (c) they generate opportunities for tourism, creating jobs and income.

To ensure the sustainable, long-term effects of MPAs, policymakers and enforcers must follow standard practice in the identification, design, and establishment of MPAs, including the establishment of networks based on sustainable conservation perspective or management objective.

As stated by Conservation International (CI)-Philippines, “MPA sites are selected and established based on the results of biological and social research, and those which have the most potential for delivering conservation benefits” (CI-Philippines, 2009). It is also important to note that in the Philippines, the MPA network is regarded as a “means to improve management of existing MPAs by forging collaborative partnerships among local governments to coordinate initiatives and share information and resources” (Horigue, et al., 2014).

One good illustration is the Province of Batangas, Philippines, which features a number of established MPAs and an active enforcement network. The Batangas MPA Network encompasses 11 coastal municipalities (Bauan, Balayan, Calatagan, Lobo, Lemery, Lian, Mabini, Nasugbu, San Juan, San Luis, and Tingloy) and Batangas City, all located in the three major bays of the Province: Batangas Bay, Balayan and adjacent bays, and Tayabas and adjacent bays.

The Province of Batangas, through the coordination of the Provincial Government - Environment and Natural Resources Office (PG-ENRO), made significant progress in expanding its management strategies for sustainable development of the coastal and marine areas over the last 20 years. Starting with Batangas Bay as a demonstration site in 1994, in partnership with PEMSEA, the ICM system was replicated and now covers the entire coastline of the province (extending to Balayan and adjacent bays in year 2000, and Tayabas Bay and adjacent bays in 2005, in partnership with the World Wide Fund for Nature-Philippines [WWF-Philippines] and Conservation International-Philippines [CI-Philippines]).

Batangas Province updated a 15-year Strategic Environmental Management Plan (SEMP) (2005–2020) to address new challenges, explore new development opportunities, enhance management skills, further promote stakeholder cooperation, and strengthen policy and management integration to reduce negative impacts of development on environmental quality throughout the whole province. Three new action components were added: (1) habitat restoration and management; (2) water resource protection and management; and (3) fisheries protection and management.

In order to implement the above action components, the Provincial Government of Batangas, in partnership with CI-Philippines, established, rectified, and expanded the existing MPAs and MPA network, thereby strengthening network operation, communication, and education campaigns as well as capacity development through closer cooperation and partnerships with the 12 coastal city and municipalities of the province.

Approach and Methodology

Identify MPAs and set up MPA networks

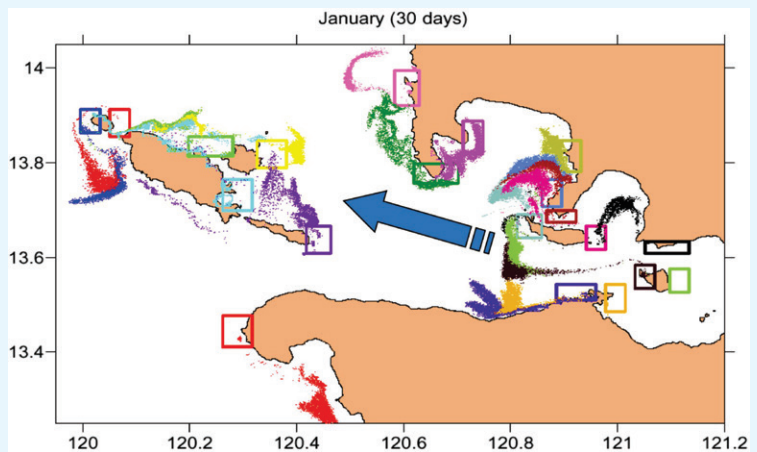
Identification of MPA sites and establishment of the Batangas MPA Network were undertaken based on scientific criteria. CI-Philippines invested in the conduct of connectivity studies in order to determine potential MPA sites based on their capability to act as efficient sources and sinks of propagules (Box 2). Previous studies revealed: “MPAs located at sink populations often depend upon replenishment from outside areas, thereby diminishing prospects for long-term viability as well as fishery benefits if the source is removed or depleted.” (Pulliam and Danielson, 1991; Roberts 1998; Stewart, et al., 2003 in IUCN-WCPA, 2008).

Box 2. Simulated larval dispersal.

An MPA network enables fish larvae to migrate from one MPA to another. Fish populations are connected to other areas through the process of larval drift (Figure 2). Fish egg and larvae spawned inside MPA in the Verde Island Passage drift along ocean currents. They can re-seed and replenish fish stocks at a distant location, helping fisheries to recover.

The MPA network, thus, provides a framework that unifies the central aims of conservation and fishery management, while also meeting other human needs such as maintenance of coastal water quality, shoreline protection, education, research, and recreational opportunities.

Figure 2. Simulated larval dispersal patterns.



The results from the studies were used as basis in rectifying and establishing new MPA sites in the Verde Island Passage. New information (e.g., presence of coral reefs, accurate coordinates, and actual size of MPAs in hectares) was used to correct the profiles of the existing areas to be protected and conserved.

Information obtained from the survey and scientific analysis were also useful for educating the communities. It provided fishers and local leaders a different perspective on the interconnectivity between sites and their importance to marine conservation. Principally, it contributed to greater appreciation among local fishers of the significance of MPAs in sustaining fishery resources and the fishing grounds, better understanding of MPA linkages with those of adjacent municipalities, and the necessity to protect bigger MPA areas beyond jurisdictional boundaries (Box 3).

Establish a mechanism for improving governance

The Batangas MPA Network was established as a multi-sectoral network consisting of government and nongovernment organizations, people's organizations, and academic institutions bound by the terms and conditions of a Memorandum of Agreement (MOA) (Figure 4). The MOA aimed to support MPA actions through complementary and collaborative efforts at the local, regional, and national levels. It was formulated in accordance with the Philippines Marine Sanctuary Strategy (PhilMarSaSt), which sought to contribute to the improvement of MPA management by conserving/protecting at least 10 percent of coastal areas by 2020 (Micalat, et al., 2008).

To facilitate the operation of the MPA network, a constitution and its by-laws were formulated and adopted. Stipulated in the constitution and

Box 3. Science-based management.

As in the identification and establishment of MPAs, scientific information should drive the management of MPA networks. Biological information such as profiles and migration patterns of species should be the basis in the design of a resilient ecological MPA network. As experts have discussed and concluded during the East Asian Seas (EAS) Congress in 2009: biological information helps design an effective and efficient network of MPAs, and should be the basis in expanding managed sites as needed to help secure critical habitats.

Figure 3A. Extent of habitats: maps and ranks (from high to low), the distribution of habitats (corals, sea grass, mangroves), and spatial extent that can be declared as protected areas.

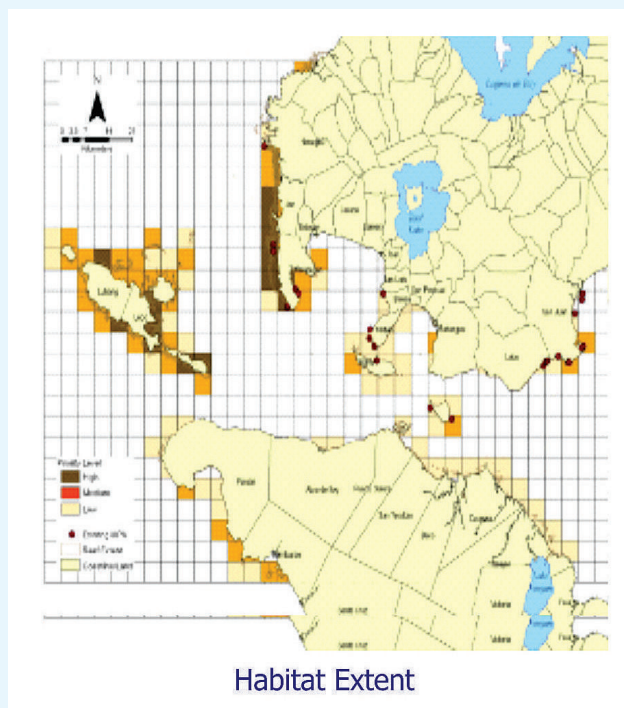
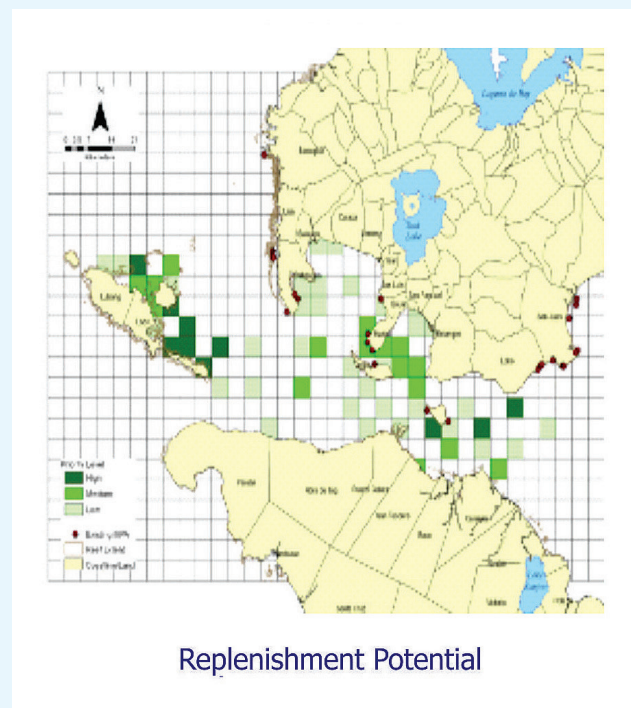


Figure 3B. Replenishment potential: based on the extent of habitats within the area, this map shows the potential sources of fish larvae (and other organisms) which need protection.



by-laws were the vision, mission, goals, policies, functions, and responsibilities of each member and officer of the network.

Develop a time-bound MPA management plan with targeted goals and actions

Network members formulated operative management plans for their respective MPAs (Figure 5). In addition to addressing threats on biodiversity from resource use conflicts and natural occurrences, the plans included

setting up a management council, organizing and mobilizing communities, delineating MPA boundaries, designating zoning for approved activities, establishing a user fee system, and carrying out information and education campaigns.

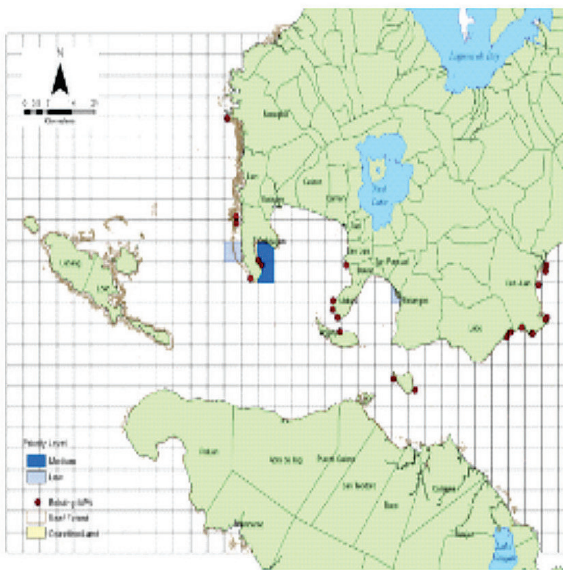
Maintain public education, communication, and awareness building programs

Public education and information dissemination activities were initiated at each MPA site to keep

Box 3. Cont.

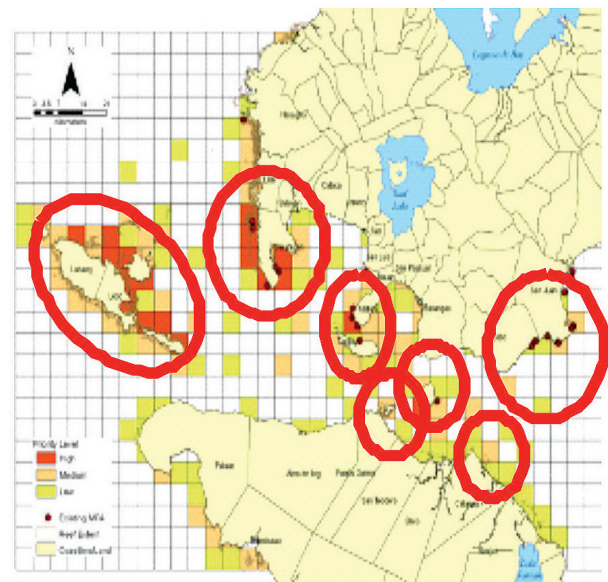
Based on the foregoing, experts proposed that MPA networks should build upon existing MPAs for scale up and better connectivity; streamline existing networks rather than create new ones; and mainstream MPAs within ICM as they cannot exist in isolation without the management of externalities or the effects from outside of the MPA.

Figure 3C. Threats based on assessment: a composite ranking of threats needed for selection, management, and monitoring of MPAs.



Threats based on assessment

Figure 3D. Best MPA options: based on the extent of habitats and potential replenishment; maps the best area on where to declare a MPA.



Best MPA Options

the communities aware of the importance of MPA and sanctuaries and to mobilize them to collectively protect and conserve these natural ecosystems of the province (Figure 6).

Signages pointing to MPA and sanctuaries were put up along the roads. These activities were made possible through a collaborative effort of CI-Philippines, PG-ENRO, and the concerned city/municipality.

Monitor, assess, and report on the impacts and benefits derived from the MPA network

Regular biophysical and socioeconomic monitoring was carried out annually to assess the health of the marine ecosystem, status of local economy, and resource utilization in the coastal community. Permanent biophysical monitoring sites were also established for the conduct of reef surveys including the monitoring of species and abundance of fishes, invertebrates, and corals.

Figure 4. Signing of Memorandum of Agreement on Batangas MPA Network.



MEMORANDUM OF AGREEMENT

KNOW ALL MEN BY THIS PRESENTS:

This Memorandum of Agreement is made and entered into by and among:

The **PROVINCE OF BATANGAS**, with office address at the Provincial Capitol, Batangas City, represented herein by its **Honorable Governor Rosa Vilma Santos-Recto**, referred to as the Province of Batangas.

The **CITY OF BATANGAS**, with office address at the City Hall, Batangas City, represented by its **Honorable Mayor Eduardo B. Dimacucha**, hereinafter referred to as the City of Batangas.

The **MUNICIPALITY OF BALAYAN**, with office address at the Municipal Hall, Balayan, Batangas, represented by its **Honorable Mayor Emmanuel Salvador O. Frenida**, hereinafter referred to as **BALAYAN**.

The **MUNICIPALITY OF BAUAN**, with office address at the Municipal Hall, Bauan, Batangas, represented by its **Honorable Mayor Ryan M. Dolor**, hereinafter referred to as **BAUAN**.

The **MUNICIPALITY OF CALATAGAN**, with office address at the Municipal Hall, Calatagan, Batangas, represented by its **Honorable Mayor Sophia G. Palacio**, hereinafter referred to as **CALATAGAN**.

The **MUNICIPALITY OF LOBO**, with office address at the Municipal Hall, Lobo, Batangas, represented by its **Honorable Mayor Virgilio R. Manalo**, hereinafter referred to as **LOBO**.

The **MUNICIPALITY OF MABINI**, with office address at the Municipal Hall, Mabini, Batangas, represented by its **Honorable Mayor Nilo M. Villanueva**, hereinafter referred to as **MABINI**.

The **MUNICIPALITY OF NASUGBU**, with office address at the Municipal Hall, Nasugbu, Batangas, represented by its **Honorable Mayor Antonio A. Barcelon**, hereinafter referred to as **NASUGBU**.

The **MUNICIPALITY OF SAN JUAN**, with office address at the Municipal Hall, San Juan, Batangas, represented by its **Honorable Mayor Danilo S. Mindanao**, hereinafter referred to as **SAN JUAN**.

The **MUNICIPALITY OF TINGLOY**, with office address at the Municipal Hall, Tingloy, Batangas, represented by its **Honorable Mayor Lauro F. Alvarez**, hereinafter referred to as **TINGLOY**.

WITNESSETH THAT:

WHEREAS, the coastal marine area of Batangas province, being part of the Verde Island Passage, possess one of the highest marine biodiversity in the country;

WHEREAS, the PGB adopted a Strategic Environmental Management Plan (SEMP), to properly manage and conserve the coastal marine resources of the province through an integrated coastal management (ICM) strategy, wherein all local government units (LGUs) are enjoined to participate and support.

Figure 5. A typical table of contents of MPA management plan.



MABINI MARINE PROTECTED AREA MANAGEMENT PLAN

Table of Contents

Executive Summary		
Introduction		
Chapter I	Profile of Mabini Marine Protected Areas and The Sanctuaries	
	1.1. Location and Area	
	1.2. Conditions of Live Hard Corals, Fishes, Living Marine Organisms And Other Assets	
	1.3. Conditions of Sanctuaries Inside the Marine Reserve	
	1.3.1. Twin Rocks Sanctuary	
	1.3.2. Arthur's Rock Sanctuary	
	1.3.3. Calaburo Rock Sanctuary	
	1.4. Socio-Economic Profile of the Communities Adjacent to the Marine Protected Areas	
	1.5. Climate Change and Its Impacts on the Marine Protected Areas and The Sanctuaries	
	1.5.1. Definition and Impacts of Climate Change	
	1.5.2. Climate Change and Coastal Environment in Mabini MPA And Sanctuaries	
Chapter II	Existing Laws and Policies Governing The Marine Protected Areas and The Sanctuaries	
	2.1. Allowed Uses and Disallowed Uses	
	2.2. Management Body	
Chapter III	Management Plan On The Marine Protected Areas and The Sanctuaries	
	3.1. Mission	
	3.2. Vision	
	3.3. Goal	
	3.4. Objectives	
	3.5. Issue Statements	
	3.6. Plans, Programs, Projects and Activities	
	3.7. Adaptation Options to Climate Change	
	3.7.1. Adaptation Goal: Functional and Healthy Ecosystem	
	Adaptation Measure: Marine Conservation Agreements	
	3.7.2. Adaptation Goal: Functioning and Healthy Ecosystem	
	Adaptation Measure: Expansion of Marine Protected Areas	
	3.7.3. Adaptation Goal: Diversified Livelihood	
	Adaptation Measure: Fisheries Sector Good Practices	
	3.7.4. Adaptation Goal: Diversified Livelihood	
	Adaptation Measure: Tourism Best Management Practices	
	3.7.5. Adaptation Goal: Built Environment Exposed to Less Exposed	
	Adaptation Measure: Building Standards	
	3.7.6. Adaptation Goal: Built Environment Exposed to Less Exposed	
	Adaptation Measure: Coastal Development Setbacks	
	3.7.7. Adaptation Goal: Human Health and Safety	
	Adaptation Measure: Community-Based Disaster Risk Reduction	
	3.8. Organizational Development	
	3.8.1. Capacity Building for the Management Body: The Marine Reserve-Resource Executive Committee (MR-REC)	
	3.8.2. Implementation of Premium Fees: Collection and Disbursement	
	3.8.3. Legitimization of the Plan	
Chapter IV	Implementation of the Plan	
	4.1. Maintaining the Plan	
	4.2. Implementation of the Plan	
Chapter V	Monitoring and Evaluation of the Plan	

Figure 6. Information campaigns were conducted to increase public awareness.



In addition, perception surveys were conducted regularly to gauge the level of awareness of the stakeholders, their perceived benefits from the MPA, their perception on the functionality of the management, and their willingness to support the program. The network was appraised of the result of the survey. The designated coordinators in turn developed and implemented improved action programs to achieve effective management in MPAs.

Recognition award

To generate sustained interest among the MPA implementers at the city/municipal level, the provincial government of Batangas, with the support of CI-Philippines and First Gen Corporation, established an incentive scheme – Recognition Awards for MPA Development Plan drafters and implementers. The awards not only recognized but also popularized good MPA governance practices and performance across members of the Verde Island Passage MPA Network in Batangas coastal city/municipalities. Aside from facilitating transparency and incentives that promote accountability of the management bodies, the award scheme also promoted the significance of MPAs.

Implement regular and deputized patrols

Management of MPA requires an enforcement system for general compliance. In the case of Batangas, this responsibility falls on the *Bantay Dagat* (Sea Patrol), a group of volunteer fishers from coastal barangays who regularly patrol the municipal waters against illegal fishing. The Bantay Dagat members were legitimate enforcers, deputized by the Philippine Department of Agriculture under the Bureau of Fisheries and Aquatic Resources (BFAR) after undergoing required training. Having been deputized by BFAR, they were recognized by the municipal government to conduct or execute their operational plans in coordination with the Philippine National Police (PNP) and the PNP Maritime Group.

Results

Increase in both size and number of MPAs

From a baseline of 445 ha of “no-take” zones and 286 ha of buffer zones in 2008, the Batangas MPA Network expanded its MPAs to 1,924 ha within a span of four years. The 38 MPAs covered 1,400 ha of coral reef and seagrass beds and 523.5 ha of mangrove forest conservation areas. While management and enforcement of these MPAs were being improved, other municipalities likewise initiated the establishment of new MPAs. By 2016, 42 MPAs were added covering an area of 2,093 ha (mangrove: 567.04 ha; coral reef/seagrass: 1,525.851 ha).

The network operation greatly enhanced coordination among stakeholders. Strict enforcement of local ordinances and fishery laws significantly lessened incidents of illegal fishing. Over time, incremental benefits were observed in those municipalities hosting MPAs and these benefits spilled over to other adjacent coastal municipalities.

Sustainable financing

The MPAs are attractive tourist sites, especially to those interested in coral reefs and marine life. They contribute significantly to the local tourism industry. In Batangas Province, the local governments enacted a Unified Conservation Fee ordinance to finance the management and maintenance of the local tourism industry. User fees were collected from divers and shared between the municipal governments of Mabini and Tingloy. The fee structure consisted of a dive fee of PhP 200/per day (US\$ 4) or an annual fee of PhP 3,400 (US\$ 68) per guest. On the other hand, Mabini and Tingloy residents were required to pay only PhP 1,500 (US\$30) annually. The fees were set aside as a trust fund, 85% of which was intended solely for conservation of MPAs and the

remaining 15% was for the general fund of the local government units (LGU).

In addition, the local governments hosting the MPA network also increased their appropriation in support of the various programs and projects. The provincial government allocation for environment increased from PhP 4.97 million (US\$ 112,000) in 2008 to PhP 14.135 million (US\$ 320,000) in 2014.

Lessons Learned

Science plays a major role in the establishment of effective network of MPAs. Identifying areas to be declared as protected and conservation zones needs to go through scientific assessment to determine the extent of habitats, current and potential threats, and replenishment potential. An understanding of the extent and level of MPA management coverage in terms of biodiversity conservation is vital to the success of the networks. The use of geographical information system to translate scientific information into easily understood maps was an effective tool in convincing stakeholders and communities to be part of the MPA network.

The ICM program contributed to a successful and sustainable MPA network. The ICM program provided the concerned city/municipal governments the avenues, collective planning and management framework, partnership platform, and policy and coordinating mechanism conducive for the development and implementation of sustainable network of MPAs. The inter-LGU arrangements, joint fisheries law enforcement, and establishment of bay management councils were some of the outcomes of ICM implementation. The MPA management plans and the subsequent capacity development contributed to the overall objective of sustaining biodiversity conservation of the broader ICM

program. Similarly, effective law enforcement required close interagency coordination and mutual support. For example, the strict enforcement of local ordinances and fishery laws by *Bantay Dagat* not only reduced the incidents of illegal fishing but also contributed to fishing and nursery grounds protection.

In addition, the ICM objectives, frameworks, processes, and platforms offered partnership opportunities for new or additional inputs or investments by other national or international donors/organizations in enhancing conservation and sustainable development objectives. The participation of CI-Philippines presented the mutually reinforcing cooperation and partnership with PEMSEA, which has contributed significantly to the effective functioning and sustainability of the MPA network.

Build strong partnerships. Strong collaboration and partnership across national government agencies, NGO, academic institutions, private sector, and other stakeholders in planning, implementation, enforcement, and management was needed to sustain protected area management.

Ensure suitable livelihood opportunities/options that are part of the MPA network development.

Local community participation would be difficult to achieve if MPA management did not integrate community development objectives, in particular, employment and livelihoods. Some MPAs in Batangas were managed as ecotourism ventures, largely by people's organizations (e.g., "Ang Pulo" [Calatagan Mangrove Forest Conservation Park]) or by dive site operators. With the increase in tourist arrivals, business plans were developed, which created opportunities for the communities to earn additional income such as tour/dive guides and boatpeople (servicing divers), by serving as crew and staff members in resorts, by selling souvenir items like bags and t-shirts, and by offering food catering services.

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A Gazetted Integrated Coastal Use Zoning Plan for the State of Selangor, Malaysia

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Key Message

- Integrated coastal management (ICM) program implementation in the State of Selangor, Malaysia were reinforced by the gazetted integrated coastal use zoning plans (ICUZP) of all its coastal areas including Klang and Sepang municipalities, as well as Kuala Langat, Kuala Selangor, and Sabak Bernam districts. Each plan was aimed at preventing or reducing multiple-use conflicts of concerned sea and land areas.
- The ICUZP was the reference for the approval of coastal and marine development in each of the concerned municipalities and districts with due consideration of and in coordination with the respective local development plans.

Abstract

Each coastal municipality and district in the State of Selangor developed and implemented an ICUZP with the objective of increasing the effectiveness and benefits of integrated planning and management of coastal and marine areas using ICM

principles and practices. The ICUZP identified and designated uses or activities based on the available coastal resources and the functional characteristics of the ecosystems in a given area or zone. In line with the Selangor Water Management Authority (LUAS) Enactment of 1999, ICUZP and Hazard Map for Coastal Areas were gazetted. The gazetting of ICUZP enabled LUAS to secure commitments from the state government and local governments to implement and sustain the ICM programs.

Background

The coastal zone of Selangor, being rich in natural resources and productive ecosystems such as mangroves, and attractive coastal landscape, poses unique management challenges. It was heavily utilized for economic development, human settlement, and recreation. Being close to the Strait of Malacca, the coastal zone also became a popular site for port and industrial development.

The coastal zone in Selangor is defined as the area where coastal waters and the adjacent shore meet. The seaward area of the coastal

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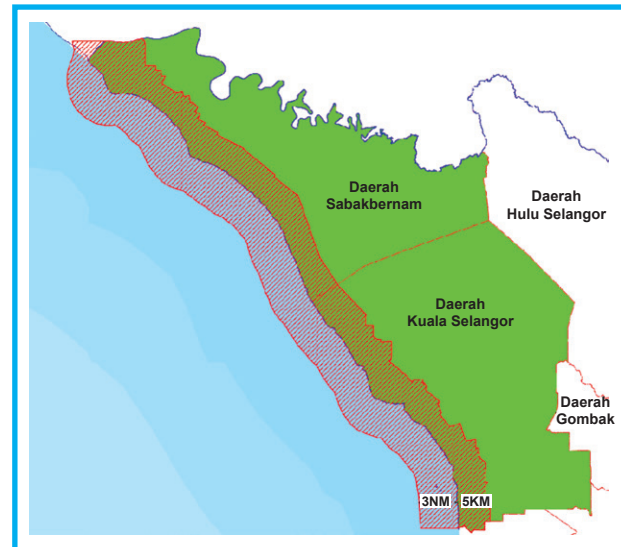
zone extends from the low-water line to a distance of 3 nautical miles or to the extent of Selangor State jurisdiction as determined by maritime boundary treaties. In addition, the landward area of the coastal zone includes the intertidal zone along with an area that extends from the high water line to a distance of 5 km and including the full extent of any gazetted nature reserves or other ecologically sensitive areas defined by the Selangor government that extend further inland than the 5 km boundary (Figure 1).

In line with the Selangor State Structural Plan, all ecologically sensitive areas and the corresponding coastal ecosystems should be protected or used in a sustainable manner. In 1997, Port Klang, one of the coastal municipalities in the State of Selangor, was selected as a demonstration site to develop and implement an ICM program with the technical support and guidance from the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) with LUAS serving as the lead

coordinating agency (LUAS, 2005; PEMSEA and Port Klang ICM National Demonstration Project, 2005). The Port Klang ICM project gathered information for the preparation and development of the Port Klang Coastal Strategy (LUAS, 2005), which led to the development and implementation of ICUZP, in support of the management practices of the government.

This case study presents the process, outcomes, and lessons learned from the development, legalization, and implementation of ICUZP in the various districts of Selangor.

Figure 1. The extent of coastal zone for Northern Selangor with the coastal zone boundary depicted by the red boundary line. The study area is 104,900 ha including a sea area, which is 3 nautical miles from the low tide water line and a land area, which is 5 km from the high tide water line.



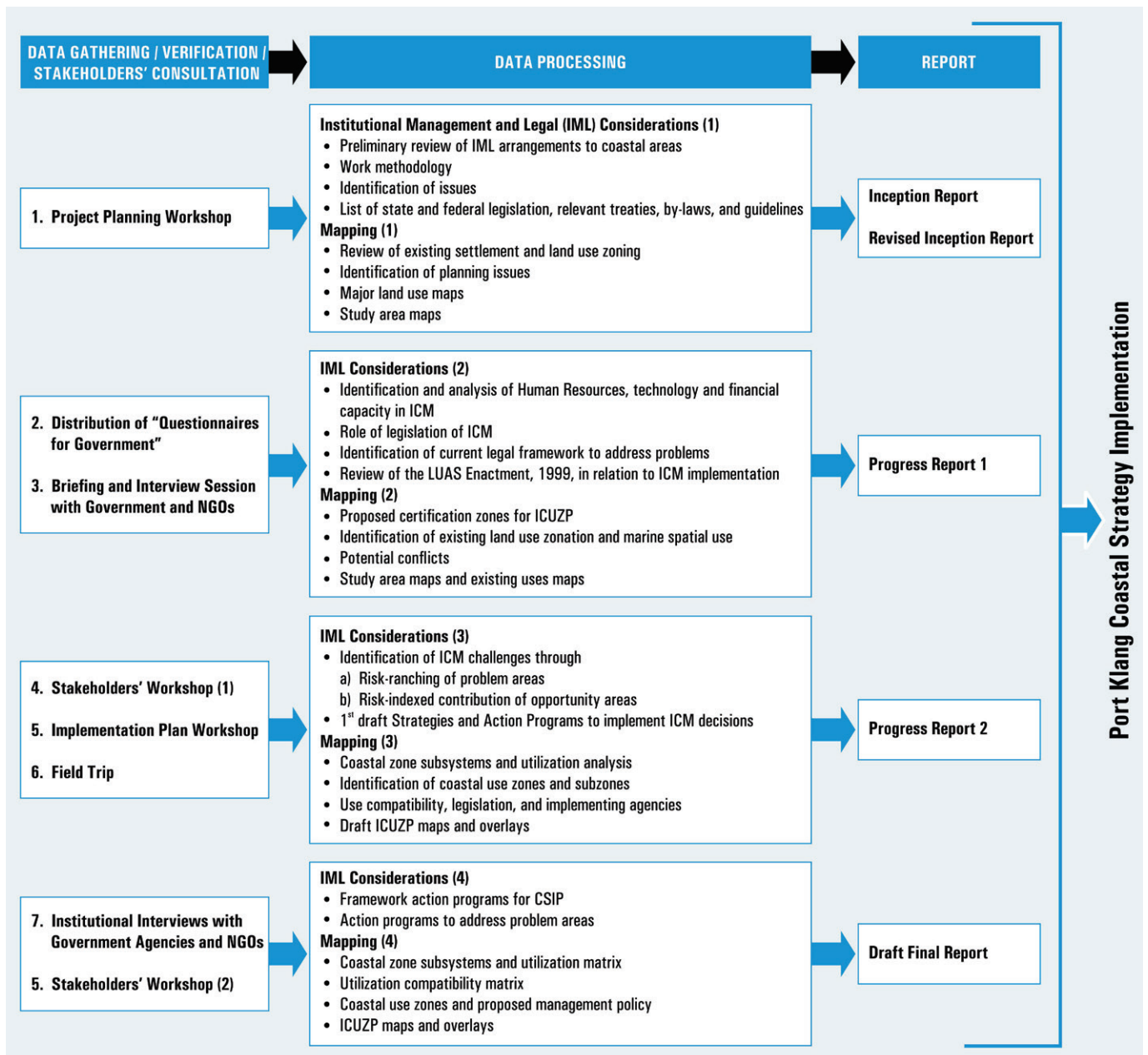
Approach and Methodology

Development of ICUZP

The formulation of ICUZP was a step-wise process that involved national and local government agencies (i.e., economic, planning, and environment), key stakeholders, and

experts following a series of consultations with legal personalities, academic institutions, interested parties, and government agencies with administrative and management responsibilities. The process was also consistent with current administrative and management structures and practices of the country. Figure 2 outlines the key steps that were followed in the formulation of the coastal use zoning plans.

Figure 2. Key steps leading to the formulation of coastal use zoning plans in Selangor.



Building consensus

Consensus building between resource users and coastal managers whose priorities were often incompatible with one another was a critical aspect of ICUZP development. Government agencies, nongovernment organizations (NGO), private sector, and local communities were key players in securing consensus on the use and priority activities within the proposed coastal use zoning arrangements.

The consensus-building approach included workshops, interviews, and one-on-one meetings. These interactive gatherings provided the necessary platform whereby proposed coastal use zoning arrangements were discussed and agreed upon by the key stakeholder groups. In particular, existing and potential multiple use conflicts were identified such as freshwater versus marine water uses, economic development activities versus resource conservation, etc., to rationalize compatible activities within a designated zone.

Securing approval

In accordance with the LUAS Enactment of 1999, the state is required to develop and implement integrated management plans, as stated in Section

46. Under this section, LUAS is mandated to develop and implement an integrated management plan for the conservation and sustainable development of any water resources (LUAS, 1999). As such, the proposed development of an ICM program for Port Klang was in line with the mandate of LUAS, which took up the initiative to prepare ICUZP in collaboration with respective district planning offices. In order to implement ICUZP, LUAS secured the approval of its Board of Directors (BOD), during a BOD meeting, chaired by the Chief Minister of Selangor State.

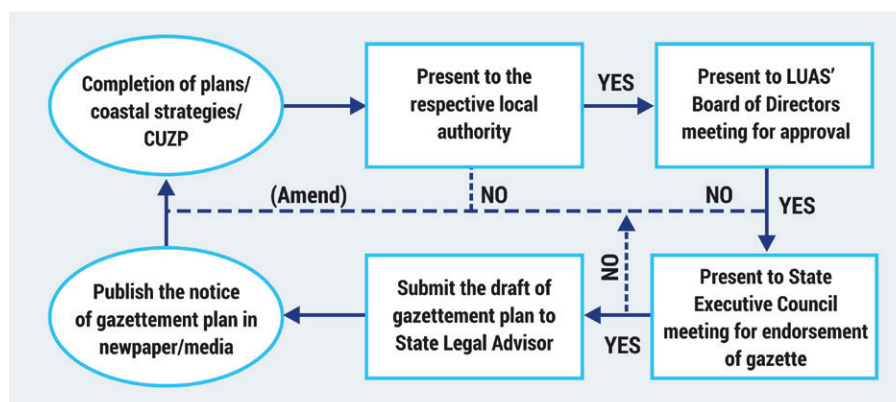
Gazetting ICUZP

In line with the town planning practices in Malaysia, coastal use plans must be gazetted to ensure legal authority and enforceability. The gazetting processes that were followed by LUAS are illustrated in Figure 3.

ICUZP implementation

Following the gazette, LUAS was the designated lead agency for coordinating the implementation of the ICM plan with the involvement of all stakeholders, in accordance with the LUAS Enactment of 1999. To ensure successful ICUZP implementation, all the concerned local

Figure 3. Flow chart of the gazetting processes.



governments and land offices were expected to submit their proposed plans of coastal development to LUAS for initial review before any approval was given by the district/municipal council. As a general practice, LUAS was responsible for reviewing the proposed development plan based

on the coastal zone subsystems and utilization for each municipality and district. The subsystems were developed upon reviewing the natural physical environmental profiles of the coastal municipalities and districts vis-à-vis current and predicted economic uses (Table 1).

Table 1. Coastal use zones and subzones and uses compatibility (LUAS, 2005).

No.	Coastal Use Zone	Subzones	Uses Compatibility	Permitted Activities	Nonpermitted Activities	Legislation	Institutions/ Agencies
1.0	Ecologically Sensitive Area & Protected Gazetted Zone		2.0, 5.0, 6.0, 7.0				
1.1		Mangrove	7.1	Ecotourism, research	Residential, industry (all types), commercial, logging (except if licensed by the FD), waste disposal	FE, LUAS, NFA	FD, local authority, LUAS
1.2		Mudflats & River Setbacks	6.4	Cockle farming, riverine recreation, cockle spat collection	Infrastructure, development, waste disposal, reclamation	NLC, LUAS	DID, LUAS, PTG, local authority, DOE
1.3		Wildlife Sanctuary	7.1	Ecotourism, research	Residential, industry (all types), Commercial, Logging (except if licensed by the FD), waste disposal	PWLA, NFA, NPA, FA	DWNP, FD
1.4		Inland Forests	6.2	Artisanal nondestructive fishing	Industries (all types), residential, waste disposal	FE	DOF, FD
1.5		Maritime Heritage Protection	2.1, 2.3, 7.1, 7.4	Ecotourism, recreation	Waste disposal, reclamation	AA, LGA	Local authority, TDB, Antiquities
1.6		Buffer Zone	2.5, 5.1, 5.3, 5.5	Recreation, agriculture, livestock	Open burning, pound-based aquaculture, industries	NLC, LGA, LUAS, FA	LUAS, local authority, PTG, DOE, DA, DOF

Note: The column on “Uses Compatibility” employs a numerical coding based on the coastal use zones vis-à-vis permitted activities. For example, in mangrove area, the permitted activities are ecotourism and research with a coding number of 7.1.

Legislations:

AA – Antiquities Act, 1976; FA – Fisheries Act, 1985; FE – Forestry Enactment, 1934; LGA – Local Government Act, 1976; LUAS – Selangor Waters Management Authority; NFA – National Forestry Act, 1984; NLC – National Land Code, 1965; NPA – National Parks Act, 1980; PWLA – Protection of Wildlife Act

Institutional agencies:

DA – Department of Agriculture; DOE – Department of Environment; DOF – Department of Fisheries; DID – Department of Irrigation and Drainage; DTG – Department of Lands and Mines; DWNP – Department of Wildlife and National Parks; FD – Forestry Department; TDB – Tioman Dive Buddy.)

Results

Coastal use zoning provides a plan and a regulatory system to designate the appropriate zones for specific uses based on the functional capability and suitability of the land and water ecosystems. Developments in each defined zone or subzone are based largely on the common vision of the stakeholders, existing policies, and ecological, cultural, and/or traditional considerations (PEMSEA, 2007). The implementation of ICUZP was started in 2001 in Port Klang, consisting of two districts, namely, Klang and Kuala Langat. It was replicated and extended to another three districts: Kuala Selangor, Sabak Bernam (Northern Selangor ICM), and Sepang over a span of 15 years, i.e., Port Klang ICUZP (2010), the Northern Selangor (2013), the Sepang ICUZP (2015) (Figures 4 and 5). An example of a detailed ICUZP for Northern Selangor is illustrated in Figure 5.

Multiple benefits of implementing ICUZP have been realized over the past 15 years in

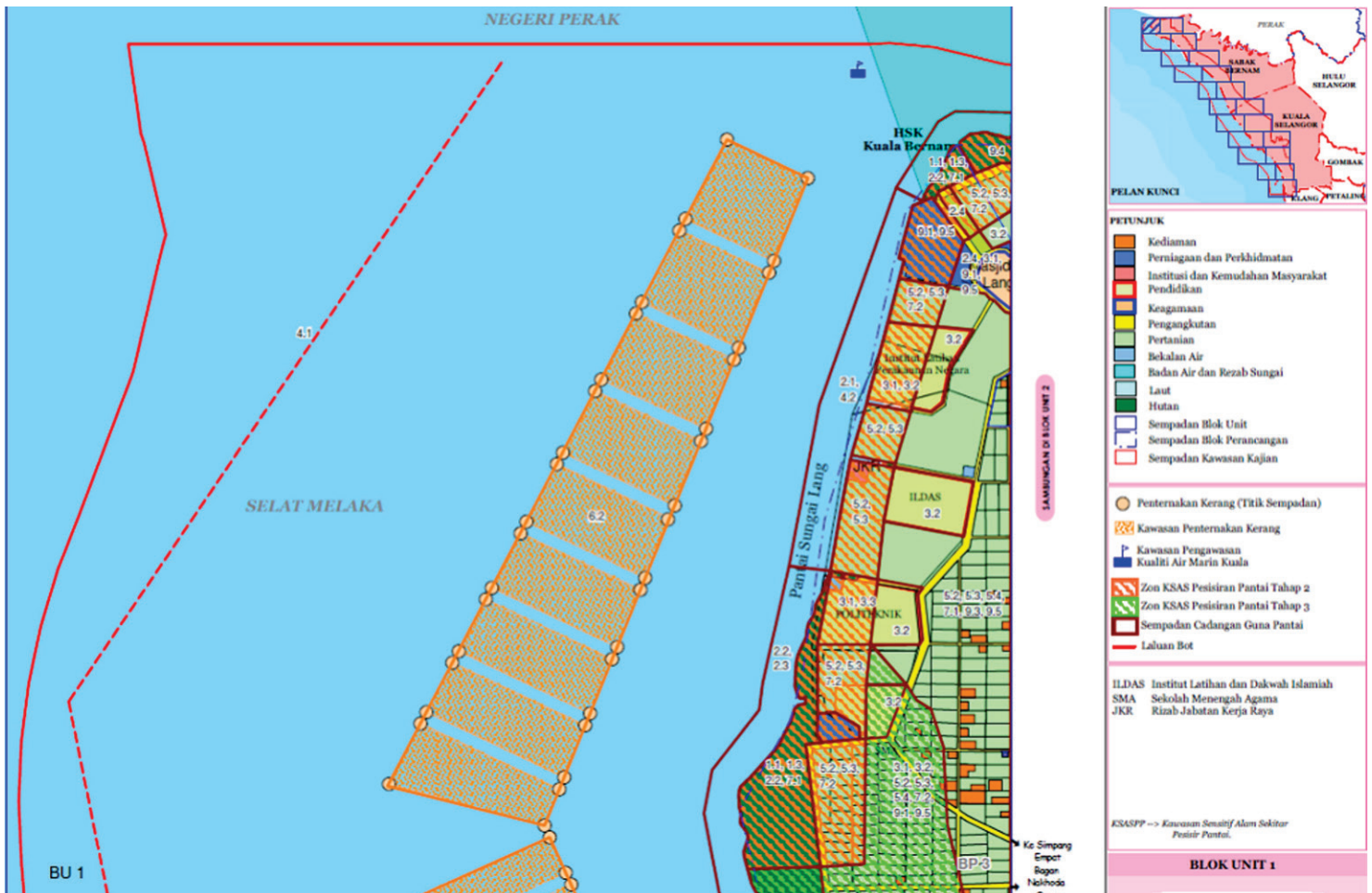
Selangor State, including: enhancement in the manageability of coastal waters of Selangor; reduction in the adverse impacts of land-based activities on the surrounding marine waters; substantial reductions in multiple use conflicts among resource users; and harmonization of existing and new economic activities. Collectively, the implementation of ICUZP has reduced negative impacts on the environment.

The value of ICUZP was fully appreciated during a major case involving an application for coastal reclamation to construct hotels and resorts in Kuala Selangor. When the application was considered with reference to Northern Selangor ICUZP, it was found that the proposed area for development was within the protected zone for the settlement of the cockle spats, clearly marked as “cockle spat area” in ICUZP. Therefore, any reclamation activities should be prohibited or restricted. Accordingly, the state government rejected the proposed project and was commended at the State Assembly.

Figure 4. Three coastal use zoning plans for Selangor State (L-R): Port Klang Coastal Strategy Implementation Plan, Coastal Use Zoning Plan for Kuala Selangor District, Coastal Use Zoning Plan for Sepang District.



Figure 5. ICUZP for Northern Selangor. This figure depicts the coastal zonation arrangements through the use of color coding and numerical classification. Symbols as explained in the legend represent current usage and some known physical attributes of the ICM site.



Lessons Learned

The following lessons have been learned from ICUZP implementation in Selangor over the past 15 years:

1. **Coastal use zoning plans are more effective if they are enforceable by law.** The ICUZP in Selangor was in line with and supported by LUAS Enactment of 1999, thus providing a legal basis for LUAS to enforce the
2. **Coastal use zoning plans can be integrated with and complementary to land-use plans.** The ICUZP was used as a tool for managing and allocating spatial uses of Selangor's coastal and sea areas and resources which complemented the existing local plans that only focused on development in the mainland.

3. **Gazetting coastal use zoning plans enables upscaling and sustainability of ICM process.**

The gazetting process in Selangor ensured the long-term implementation of the ICM program which mandates all coastal districts to undertake sea use planning in the entire coastline of Selangor.

4. **Institutionalization of the zoning process and practice is essential.**

A state-led agency, as exemplified by LUAS, plays a critical role in coordinating, facilitating, and streamlining ICUZP practice into a state economic development program over the longer term.

In addition, the integration and coordination between local plans and state-wide ICUZP were needed in order to avoid overlapping and conflicting issues. Initial review of all local plans by LUAS was necessary to ensure that the proposed development meets the zoning designation and use compatibility.

5. **Political will is critical.** Strong political will and support from the state government were important drivers for addressing multiple-use conflicts through the implementation of ICZUP for the entire state coastline of Selangor. Without the support of the Chief Minister and State Assembly, the ICUZP would not have been possible.

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IV

Synthesis and Lessons Learned

A Functional Integrated Coastal Management System towards Achieving Sustainable Development Objectives

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The continuing case for strengthening and sustaining ICM systems

Over the past 50 years, coastal management evolved from a variety of concepts and practices into an integrated coastal management (ICM) system. This was achieved as a consequence of improved knowledge and appreciation of coastal and marine ecosystems, land-sea and human interactions, and man's impacts on the environment as well as growing recognition of the need for a more systematic and holistic management approach to mitigating/resolving complex coastal governance and management challenges (Bonga and Chua, [this volume](#)).

Nevertheless, not all coastal problems can be resolved by the application of ICM. Coastal management issues can be very complex, inter-related, and complicated as they involve the regulation of human behavior. Coastal

management is about regulating human impacts on the health of the environment for the sustainable use of coastal and ocean resources. Time is also an important factor as many coastal management challenges require long-term management interventions to reach effective solutions. For example, the application of appropriate ICM tools to identify causes and impacts requires the use of scientific or technical procedures. The design of science-informed management actions requires multiple engagements and convening of main actors and stakeholders over long periods of time (Cicin-Sains and Knecht, 1998; Olsen, 2003; Chua, 2006). This partly explains why many past coastal management initiatives, including ICM, were not able to sustain beyond the customary project phase of 3–5 years (Chua, 1996).

A very complex situation is at hand. The usual socioeconomic drivers are all too prevalent in vast areas of the region which make the management of coastal areas very

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difficult with: burgeoning population growth and volatile economic growth, over extraction of resources, unrelenting poverty, pronounced habitat destruction, and chronic land-based pollution. Significantly depleted and altered resource stocks and ocean and coastal ecosystems (and their compromised capacity to provide food and services) are well documented. The recent widespread negative impacts of climate change on habitats and the environment, coastal settlements, other built-up areas, and livelihoods compound this complexity. In fact, most of the recent emergencies and disasters are known to have “no analogue states,” whereby current emergencies cannot be addressed by past “solutions.” (Ross, 2012).

While some problems could be easily solved through scientific and turnkey technological interventions, complex challenges require a combination of policy, legislation, education, financing, capacity, and political will to effect change. Science alone is not adequate to address most problems encountered. As such, appropriate use of traditional and cognitive knowledge learned from experiences and practices are also needed. An adaptive approach to management has been prescribed to allow other sources of knowledge to operate together to augment inadequate scientific information.

The application of the precautionary principle also remains a guiding principle as some problems might be temporarily resolved but may recur after some time. Some might not be resolved at all despite collective efforts. Rittel and Weber (1973), Ludwig (2001), and Jentoft and Chuenpagde (2009) considered these types of problems as “wicked”. Parts of that wickedness come from intractable uncertainties brought about by ecological, political-institutional, economic and socio-cultural disruptions that make anticipating (and predicting) both their negative and positive consequences, daunting, on the one hand, but offering immense opportunities, on the other.

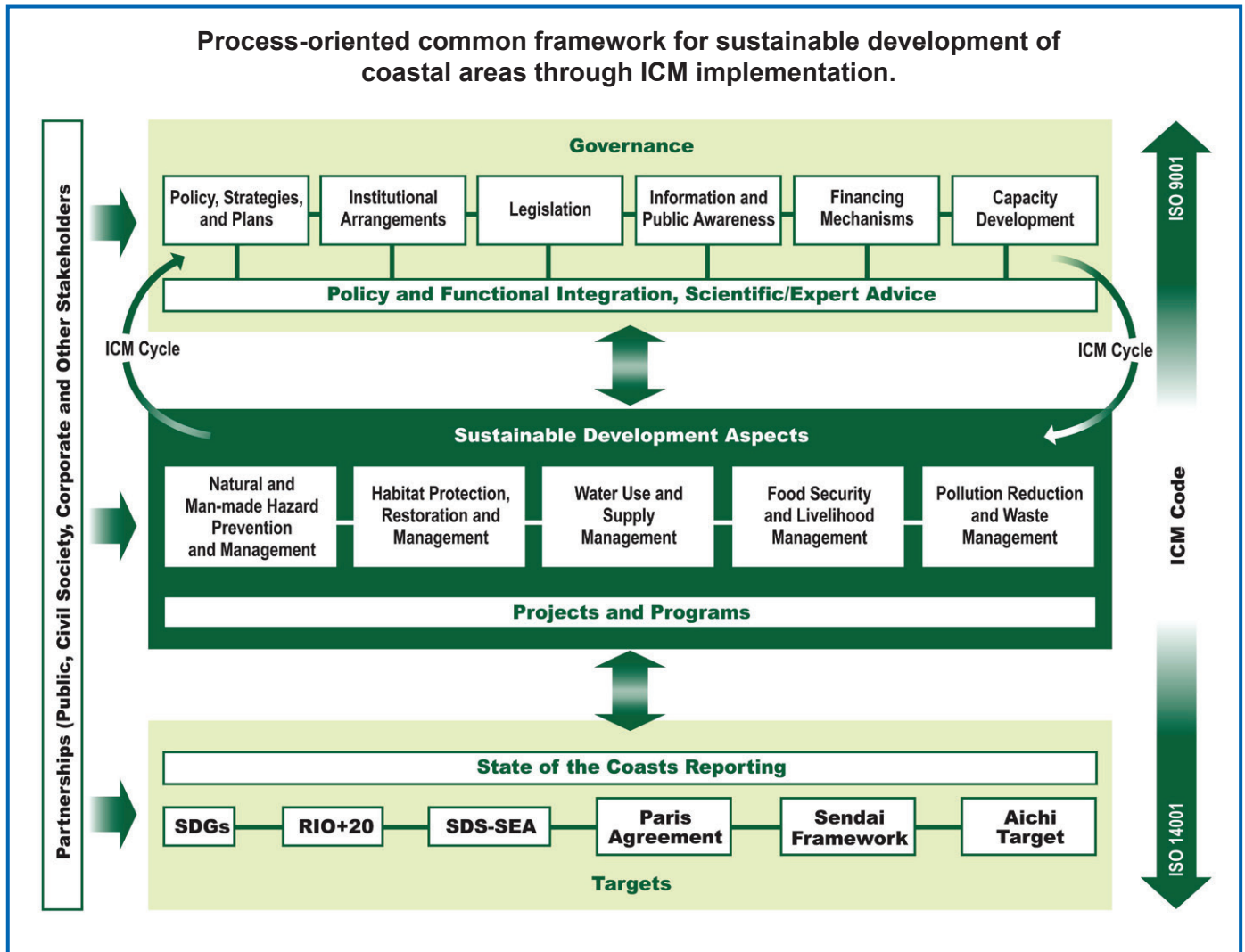
Governing and managing the sustainable use of the coasts, islands, and oceans remain a formidable challenge, which has been heralded time and again. Recently, the challenges have been equally matched by a change in mindset that looks at opportunities created by innovations in policies, structures, mechanisms, and leadership strategies to address current ecological and developmental dilemmas. One of the results, the growth in integrative and collaborative coastal governance approaches, has consequently widened the policy and action spaces needed to accommodate the many and varied perspectives required by these challenges.

ICM systems offer an integrated coastal governance and management system that is predicated on a longer term, holistic, adaptive, integrative, ecosystem-based, and systematic management approach to address a host of coastal management challenges and complexities. Over time and across the region, the ICM systems address complexities of inadequate or weak cross sectoral governance and management, as well as poor political and social acceptance of integrative approaches, inadequate policy-science interface, lack of financial resources, and weak institutional capacity.

The term “governance” is generally defined as one that “addresses the formal and informal arrangements, institutions and mores by which societal issues are addressed. Governance questions the fundamental goals, the institutional processes and the structures that are the basis for planning and decision-making. Governance sets the stage within which management occurs” (Olsen, 2003). The term “management” denotes “the process by which human and material resources are harnessed to achieve a known goal within a known institutional structure” (Olsen, 2003).

The ICM system adopted in the EAS region incorporated key elements of governance and management to address coastal use challenges and sociopolitical barriers including the “wicked problems” mentioned above. Hence, the

Figure 1. The ICM system: an operational model for achieving sustainable coastal development (Source: PEMSEA, 2007; Chua, 2008).



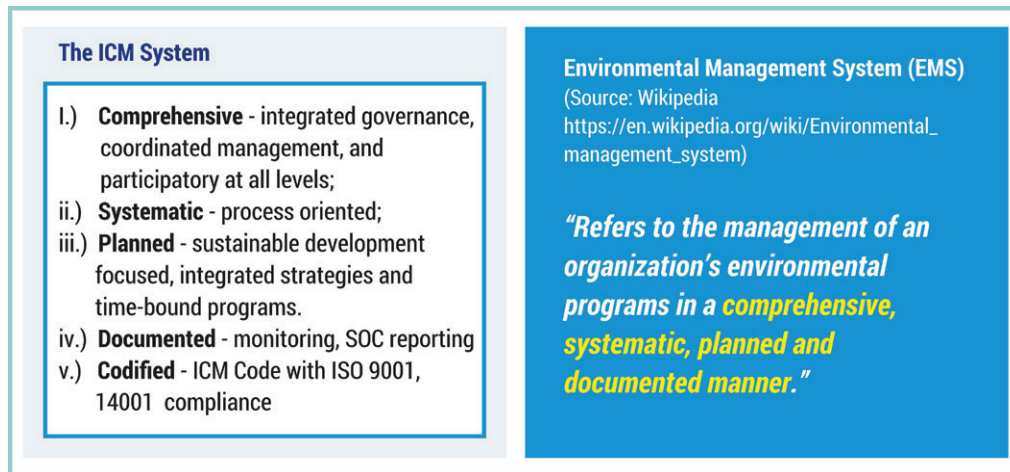
evolved ICM system includes “governance” and “management (or the sustainable development aspects)”. These two essential components are mutually reinforcing towards common objectives (Figure 1).

The ICM system evolved from decades of coastal management practices, the key elements of which were grouped into six components (Chua, 2008): (a) governance, (b) management (sustainable development aspects), (c) ICM cycle, (d) stakeholders’ participation, (e) monitoring, evaluating, and reporting, and (f) code of practice.

It is an environmental management system: comprehensive, systematic, planned, documented, and codified (Figure 2); and increasingly being proven to be effective for addressing management complexities of coastal areas.

The governance component plays the essential roles of: (a) strengthening the application of policy and legislative measures as well as institutional reform in implementing vision-led strategies and action programs; (b) enabling stakeholders and the general public as well as keeping them informed through effective communication; and (c) incorporating

Figure 2. ICM system as an environmental management system (EMS).



sustainable financing and capacity development into the planning and development stages of the ICM process.

The management component focuses on addressing existing and potential threats to sustainable development including: (a) natural and human-made disasters and the impacts of climate change; (b) loss or degradation of habitats and ecosystems; (c) shortage of freshwater supply and resources; (d) overexploitation of fisheries and other marine resources and loss of livelihoods in fishing communities; and (e) increasing risks arising from untreated sewage and industrial wastewater discharges and mismanagement of solid waste. These challenges are common concerns of countries in the region and the world as a whole. In fact, they are prominent sustainable development challenges of the Sustainable Development Goals (SDGs). The SDGs, adopted by the United Nations in 2015 to further secure political commitment for sustainable development, provide 17 goals and 169 targets. They guide actions globally in key areas where the government, the private sector, and citizens will have to invest to transform economies and prosper within social and ecological boundaries. SDG 14 (Life Below Water) focuses on the ocean; indeed the first time that the ocean was included in the global agenda.

ICM Performance, Key Lessons, and Applications

The purpose of this section is to: (a) evaluate the performance of ICM as advocated by PEMSEA over the last two decades including achievements and ongoing challenges; (b) delineate the key components and essential elements of ICM; (c) distill key findings and lessons drawn from the case studies presented in this volume; and (d) provide direction for enhancing ICM system application in support of the SDGs, especially SDG 14.

This section also reviews the changes that were made within the context of an ICM system over time. We assessed the ICM system in two layers:

One layer involves appraising the ICM system as it matured over 25 years as a functional environmental management system (Figure 2) with its components and dynamic processes. The ICM system has undergone a series of evaluations over the years: its development from being a “resource management system” with essential elements consisting of three mutually supporting components of processes, issues, and actions (Scura, et al., 1992; Chua, 1993); to a system focused on concept, operation, and effectiveness (Chua, 1998); then to a system of dynamic processes which steer an ICM program (Chua,

2006); and finally to an environmental management system that is comprehensive, systematic, planned, participatory, documented, and codified (Chua, 2008, 2013, 2015).

Another layer frames this appraisal on the basis of the ICM system's main operational objective, which is to positively "disrupt" the conventional sectoral way of managing coasts and oceans. ICM started to "shock" a prevailing system five decades ago; in a very constructive way, it offered a very rational — albeit an out-of-box, innovative — integrative approach to solving problems in coastal areas (Bonga and Chua, this volume). It was a paradigm shift when it was first offered as a solution; and to use today's parlance: a disruption. To stand out amid various approaches and to effect change, a disruptive product or service must be viable, valuable, and validating (see Salazar, 2017). As a disruptor, ICM's beneficial impacts may be articulated in three ways:

- **An ICM system is viable (and doable).** The components of the ICM system are able to create a context conducive to the initiation of: (i) integrative planning and governance; (ii) partnership approach; (iii) consensus building; and (iv) capacity building
- **An ICM system is valuable.** An ICM system is able to demonstrate how to operationalize integration. As evidenced by the case studies, the six components of the ICM system were able to address environmental, social, and economic concerns in synergy. An ICM system is valuable as an appropriate and effective mechanism to addressing local environmental and sustainable developmental challenges in the coastal areas.
- **An ICM system is validating.** To a significant extent an ICM system has "disrupted" the sectoral way by highlighting its limitations and gaps of doing things. An ICM system is able to set up a portfolio of solutions that contribute to

sustainable development of coastal and marine areas, and to the SDGs.

The evaluation analysis is largely based on the outcomes, performances, and experiences derived from the two earliest ICM demonstration sites in Xiamen and Batangas as well as subsequent ICM parallel or replication sites of the participating countries. All sites followed the framework and processes of the ICM system in planning and implementing their ICM programs. The analysis also builds upon various key findings, achievements, and experiences from 47 case studies in this volume.

The 25 years of ICM practices in the EAS region have collectively demonstrated the following:

An ICM system is viable and doable

The ability of adopting holistic and integrative approach in addressing coastal management complexities within defined geographical and administrative coverage was demonstrated in the East Asian Seas region for nearly 25 years. In that time, the experiences across various political, social, and economic conditions amid a wide range of management issues of local, national, and global concerns indicated that establishing a functional ICM system was viable and doable.

Since the initiation of ICM in Xiamen and Batangas in 1993, all ICM demonstration and parallel sites continue and sustain their programs on their own, which is highly reflective of their local capability to operate, finance, and scale up ICM practices. The ICM sites also demonstrated that their initiatives were able to overcome political, financial, capacity, and other management related obstacles such as change of government and leadership, inadequate financing, interagency conflicts, etc.

The essential elements of the ICM systems were used as levers to effective planning (and implementation) including the coordinating

mechanisms and inclusion of experts on natural and social sciences in decisionmaking; and the necessary relationships and/or partnerships arrangements and platforms to connect policy priorities with science, social contexts, values, and institutional capacities.

To become viable and doable, an ICM system utilizes three fundamental strategies: (1) translate an integrated coastal governance and management policy to a continuously implementable political and administrative agenda; (2) strengthen institutional and management capacity over time for sustainable management and quality assurance; and (3) provide mechanisms for progressive and scalable planning and management interventions and solutions.

From a policy agenda to a political agenda

The road to better coastal management is littered with hundreds of policies and plans that remain unimplemented. No matter how good and well-intentioned policies were previously, they hardly moved past planning stages. Institutional structures and mandates (even personal or community perceptions, values, and assumptions) were not ready (or were not reframed or re-imagined) to accommodate a new way of doing things. In recent decades, an ICM system advocated by PEMSEA — in itself a concept and an implementable learning tool which is evolving — demonstrated how an integrated coastal governance and management framework could become politically, logistically, and financially feasible over time. The ICM system was operated synergistically within a local government's own policy cycle of planning and development processes and mandates. It is what experts prescribe as a system that can grow and mature towards more effective managerial, information and participation platforms and processes (e.g., Chua, et al., 2008; Sarda, et al., 2014).

Political acceptance and legitimacy. ICM practices at demonstration and parallel sites received

moderate to strong political support for coastal governance irrespective of the political system, whether under centralized (e.g., PR China, DPR Korea, Viet Nam) or democratic system (e.g., Cambodia, Timor-Leste, Indonesia, Malaysia, Philippines, PDR Laos, Thailand) or whether the sites were operating under ruling (in most ICM sites) or under an opposition party (Klang, Malaysia).

The platform for legitimacy came from the buy-ins when local issues, threats, and priorities were contextualized through the ICM tools (e.g., coastal profiling, coastal strategies, risk assessments, and stakeholder analysis). These tools created and communicated powerful images that inspired change and fostered commitment to the long term. They were also instrumental to the legitimacy of governance and management decisions (Chua, 2006).

In some sites, the level of political support wavered after a change in local government leadership occurred. In Bataan and Guimaras in the Philippines, respectively, political support suffered a temporary setback due to change in local leaders. However, the resiliency of the ICM approach brought about by its institutionalization within the government and strong stakeholders' support, especially from the private sector partners, helped to regain political acceptance to move the ICM program forward. In fact, the realization of the usefulness of the ICM approach and impacts eventually converted some political opponents into ICM champions.

Local-government driven. All existing ICM programs in sites throughout the region are still driven by their respective local governments. With local authorities taking the leadership in program implementation, an interagency cooperation and collaboration among sectors was facilitated, including forging development and implementation of action plans covering a wide spectrum of coastal issues. This strengthened the legitimacy of ICM initiatives, which in turn enabled mobilization of

Box 1. Policy, strategies, and action plans; institutional arrangements; and legislation.

Policy is an indispensable instrument in coastal governance providing management direction and strategies to achieve goals and objectives. As ICM is a relatively new governance and management approach, sufficient efforts need to be invested in terms of securing political acceptance and confidence on the concept and its visible outcomes. The local government plays an important role in setting the needed policy for ICM development and implementation especially in terms of interagency, multisectoral cooperation and collaboration (Chua, 2006; Bermas and Chua, this volume).

As demonstrated in Xiamen, Dongying, Batangas, Bataan, Da Nang, Sihanoukville, and Sukabumi, local governments are fully engaged throughout the process of ICM program development, implementation, and the mainstreaming of management plans into regular line agency programs. The high-level coordinating mechanism (usually chaired by the head or deputy head) fully demonstrates its effective role in coastal and marine management particularly in setting policy decisions to

reduce interagency and multiple use conflicts; facilitating sector policy and functional integration; promoting science-policy interface; and harmonizing local and national policies in coastal and marine management and other decisions in realizing the objectives of the ICM program as illustrated in Dongying (Wang, this volume), Da Nang (Chin, et al., this volume), and Xiamen (Guo and Engay, this volume).

The setting up of an ICM program requires the leadership of local government in developing harmonized action plans to achieve a common vision. Legislation is another essential instrument in coastal and marine governance to legitimize policy and management requirements that regulate human behavior. For example, the sea use zoning scheme in Xiamen was legislated under the national legislation on Marine Space Utilization Law of 1997 and fully enforced by the local government (Fang and Ma, this volume; Guo and Engay, this volume). Similarly, the integrated coastal use zoning plan of Selangor (Malaysia) was gazetted in order to regulate coastal development (Shamsuddin, this volume).

financial resources and the mainstreaming of ICM activities into local development plans. Engaging local government during the process of initiating, developing, and implementing ICM programs was an indispensable part of the ICM cycle.

Vision-led strategy transitioned to political agenda. All the ICM sites developed and implemented their vision-led coastal strategies towards achieving commonly shared goals. This is an indication of a long-term institutional and political commitment (Box 1). Following the adoption of coastal strategies, appropriate phase-wise ICM programs were developed and initiated with due consideration of a local chief executive's

term of office, normally within 3–5 years, to address prioritized coastal issues.

A vision-led strategy is a key driving force in ICM program development. It helps to determine the direction and set the objectives at different stages of ICM program development and implementation. It promotes cooperation and collaboration among stakeholders and helps reduce multiple use conflicts. Each ICM site sets its own vision. For example, Xiamen's vision is to “develop a modern port and garden city” (PEMSEA, 2006b), and Shima City's vision is to develop itself into “a place for living, working and enjoyment” (PEMSEA, 2015a, b).

Area wide coverage. Each ICM site adopts a holistic approach in evaluating coastal challenges within the defined administrative boundary of the local government. Through the process of coastal profiling and risk assessment (Chua, 2006), coastal management issues are identified and prioritized for interventions depending on urgency of the issues, and availability of human and financial resources. The holistic coverage ensures long-term planning towards achieving sustainable coastal development recognizing that not all coastal challenges can be addressed and resolved at the same time. Some require a longer period of time to address than others.

Sustainable financing. The rationale for including financing as an essential element of governance is to ensure that long-term financial resources are given sufficient consideration at the start of the ICM program. Implementation of ICM requires a substantial amount of financial resources which are normally not allocated in regular national or local government budget (Chua, 2006; Cardinal, this volume). The types and level of financial requirements are not just the operating budget for the ICM planning and management team, but also the cost of management interventions, such as habitat protection and restoration, and pollution prevention and management, which require capital investments from government and the business sector.

The opportunity and scope for increasing financial investments are facilitated through innovative financing approaches for environment improvement projects and marine conservation, such as public-private partnerships, impact investments, and payments for ecosystem services.

A unique feature of PEMSEA's ICM demonstration sites is that the financial resources for implementing programs are still derived largely from local government budget with support from donors or private sector. This is a reflection of government commitment. The ICM programs are able to

leverage investments from national and local governments, private sector, and bilateral/multilateral financial institutions as well as foreign donors and aid-programs as illustrated in several ICM case studies of this volume (e.g., Cardinal; Sudiarta; Cardinal, et al.; and Inthachack, et al.).

The ability of the local governments to continue implementing ICM programs for the past 15–25 years is a strong testament to the value that these governments place on ICM. There is a realization that ICM implementation provides visible outcomes and benefits. For example, Xiamen has maintained a high GDP growth averaging 16% over the past two decades while making heavy investments in environmental improvements, such as restoring the Yuandang Lagoon and Wuyuan Bay, rehabilitating mangroves, resolving use conflicts in navigational channels, etc. Xiamen also demonstrated impressive cost-benefit ratio (6:1) in implementing its ICM programs (PEMSEA, 2006b). Moreover, Xiamen is regarded as a clean and beautiful city, which has boosted its tourism industry and appreciated land values around the restored lagoon and lakes, generating impressive and long lasting financial gains (Chua, 2006).

Elsewhere, Batangas was able to receive cofinancing from the Batangas Coastal Resource Foundation, aside from government budget. Cofinancing with the private sector is one factor that strengthened the local government's resolve to invest in its ICM program covering biodiversity conservation, waste management, and the establishment of a self-sustaining water quality testing laboratory (Esmas, et al., this volume). Investment in the ICM program by the local government of Sihanoukville also led to greening of the city and better beach management involving local communities and the business sector (Visal and Nay, this volume).

In discussing how ICM can leverage investments from the business sector, (Cardinal, et al., this volume) concluded that ICM is a practical platform that allows business sector to identify

and contribute to economic, social, and ecological objectives that are highly relevant to businesses and concerned communities. Accordingly, the coordinating committee at each ICM site plays a crucial role not only in facilitating allocation of line agency budgets but also in exploring innovative financial mechanisms to generate needed funds for implementation from nongovernment sectors. In addition to sustaining ICM operation through mainstreaming ICM programs into regular government budget, many ICM sites employ other approaches to generating resources such as: user fees (Bermas and Chua, this volume; Peng, this volume); fees for ecosystem services (Peng, this volume), corporate social responsibility; public-private sector partnerships (Cardinal, this volume; Cardinal, et al., this volume), and microfinancing (Narcise, this volume).

Communication. The inclusion of communication as an essential element of governance is to ensure a transparent planning and management process that facilitates and enables public awareness and participation of stakeholders and creates an informed public to support ICM initiatives. Hence data gathering, interpretation, storage, and usage became indispensable planning, management, and communication requirements. Comprehensive knowledge of the physical, ecological, social, cultural, and economic characteristics of the areas under ICM management is the basic information needed to identify and communicate opportunities and challenges that help communities move towards sustainable development objectives.

ICM facilitates a process of putting together and analyzing available secondary information, which is usually available from local agencies. In addition, information may be available from existing research projects and surveys, for use in risk assessments and the preparation of coastal profiles. Involving a local university and/or research institution can strengthen the quality, usage, and management of information for the

development and implementation of an ICM program as demonstrated in Batangas (Padura, et al., this volume). Continued monitoring and assessment can be used to assess the performance of an ICM program. For example, water quality monitoring program can provide scientific data on pollution sources and impacts; provides input to management planning, informing, and engaging stakeholders on state of the environment; and supports decisions for timely interventions (Esmas, et al., this volume). Information can also empower an informed public, as exemplified in the local communities' response to the establishment of a petrochemical plant in Xiamen and the proposed large-scale mining operation in Guimaras (PEMSEA, 2006b; Narcise and Padayao, this volume). A state of the coast reporting guide was developed (PEMSEA, 2011; Padayao, this volume) which serves as a useful tool for systematic reporting on the ICM process.

Scalable targets and solutions

ICM employs a tiered strategy which is predicated on structuring distant goals of sustainable governance and management into stepwise stages of transition, transformation, and sustainability (Table 1). The process starts by harvesting the “low hanging fruit” and leveraging initial successes into the succeeding step in the ICM cycle.

ICM cycle. The ICM system consists of prescribed processes which drive ICM activities from planning and research, to development of common vision, strategies, and action plans, to implementation, and monitoring and evaluation (Bonga and Chua, this volume; see Box 2). An ICM program moves through a series of multidimensional processes, defines and prioritizes coastal management issues, and identifies program agenda and their implementation, monitoring, and reporting. These processes forge responsibility and accountability; enhance political and social acceptance and sustainable financing; and create a critical mass of ICM expertise through adaptive learning.

Table 1. Scalable targets and solutions.

Transition	Transformation	Sustainability
<p>This stage reflects the ability of ICM sites to set up institutional arrangements (e.g., coordinating mechanism), develop vision-led, science-based coastal strategies and workplans, and stakeholder support for their respective visions and sustainable development objectives.</p>	<p>The key indicators of the this stage are: (a) increasing capacity to address a wide range of sustainable development challenges especially in terms of effective policy and legislation in environmental management, and social and economic sustainability; (b) wider management coverage of key coastal and marine challenges and effective application of ICM dynamics to effect changes; (c) effective coordinating mechanism to mobilize multisector and interagency cooperation and collaboration in reducing multiple use conflicts and to increase visible environmental outcomes and benefits; and (d) moving towards incorporating the integrated management approach into local development agenda. Most ICM sites are now in this transformation stage of ICM development.</p>	<p>The key indicators of the this stage are: (a) local government builds up a strong and effective team of coastal planners, managers, and interdisciplinary expertise within its governance system to continue to use and scale up the ICM practices; (b) local government is able to link and address coastal and marine management priorities on the local context to national policy and objectives; (c) local government mainstreams key ICM program activities into the local agenda of line agencies; and (d) improvements in environmental quality, social equity, and economic benefit are measurable and recognized.</p>

The ICM contributes to (in newly established sites) and reinforces (in matured sites) efficiency and effectivity of local governance processes. The usual tack employed in each stage is simple: from prioritization of issues; to coordination with concerned agencies and partners; to harmonization of institutional mandates; finally to mainstreaming with the local development planning and day-to-day operations. As shown in a number of the case studies, there is a strategic advantage to choosing priority issues and interventions at the initial stages of ICM program implementation. This necessitates the engagement of “like-minded” stakeholders and a focused plan of action to achieve a solution that is appreciated by all stakeholders. Over time, other priorities can be addressed by building on previous successes and experiences to scale up ICM coverage and application.

Sustainable management capacity. The ICM system facilitates the development of capacity over time (see Box 3). The learning by doing strategy

advocated by PEMSEA consists of action-based training activities vis-à-vis targeted goals and objectives of each ICM site. The tenet is “learning as an objective of doing” (Garaway and Arthur, 2004), a learning through iteration, whereby planning and implementation activities are linked to learning.

One obvious outcome of ICM program implementation, as observed in ICM sites, is the gradual increase of institutional and individual capacity in coastal governance and management. Local government planners and managers acquire first-hand knowledge and experience in coordinating, developing, and implementing cross-sectoral ICM program activities, while sectoral agencies strengthen their technical and management capacities and learn the advantages and processes of integrated management. A growing number of local governments and interdisciplinary experts in coastal planning and management are emerging and continue to increase as a consequence of geographical scaling up of ICM practices across the region’s coastlines.

Box 2. ICM cycle.

The cyclical process of planning, adopting, implementing, monitoring, reviewing, and revising is a critical component of the ICM system to enable: (a) adequately considering of environmental and social concerns, identifying causes and impacts, and prioritizing policy and management interventions; (b) the preparing and developing coastal strategies and step-wise action programs based on geographical coverage, timeframe, and human and financial capacity; (c) establishing a coordinating mechanism and lead implementing agency as well as integrating scientific and expert support; (d) setting up of a communication mechanism and stakeholders' participatory platform to inform and involve stakeholders and the general public; (e) securing of political and administrative endorsement; (f) implementing the ICM management program; (g) monitoring the progress, and assessing and reporting of outcomes; and (h) identifying areas for improvements.

After the completion of the first phase of the ICM cycle, careful analysis of outcomes, achievements, and problems are carried out and a revised plan of actions is developed and adopted for implementation in the next phase. As highlighted in Xiamen ([Zaldivar and Guo, this volume](#)), integrating ICM into the planning process of local government enhances its application. Hence, the cyclical process of the ICM system must be closely followed to ensure continued improvement of capacity and stakeholders' support, budgetary allocations, and visible outcomes in addition to strengthening, management confidence, political and

social acceptance, and cost-effectiveness.

The fact that local governments were able to sustain their ICM programs using the ICM cyclical process is a strong testimony to the process; this despite the change in local government administrations, leadership, key operating personnel, and changing priorities. Although the achievements and level of performance might vary from each ICM cycle to cycle, with the level of political commitments and stakeholders' support, there is progress. Both Batangas and Xiamen went through ICM cycles over the past 25 years with continuing political commitment and support from government and stakeholders amid changing political and operating environments. In Cambodia and Viet Nam, where local capacity and financial resources are limited, the ICM cyclical process enabled the local governments (i.e., Sihanoukville and Da Nang) to achieve their targets through incremental improvements as their capacity developed and financial resources became available.

In reviewing the usefulness of the ICM cycle, ([Bonga and Chua, this volume](#)) concluded that "knowledge of the ICM cycle is critical to correct implementation of ICM" and "ICM cycle is essential as it provides a stepwise, non-negotiable 'must haves' to be able to go to the next step". They also pointed out that the main challenge is "how to sustain the process and systematically do it" in light of changing political culture (e.g., changing political leaders), long timeframe, and alteration in financial support.

Box 3. Capacity building.

Building and maintaining a critical mass of ICM leaders and practitioners ensures sustainability of ICM efforts for continued improvements (Factuar, this volume). As such, capacity development is incorporated as a prioritized investment throughout the ICM cycle. There is a continuing demand for scientific, technical, and human management skills in ICM program implementation in order to resolve a wide spectrum of scientific, technological, policy, and management challenges under various political, social, cultural, and economic conditions. While scientific and technical skills can be obtained through conventional training, integrated management skills especially at local level are best developed through training by learning. This approach was adopted by PEMSEA for developing ICM programs across the region (Factuar, this volume; Bermas and Chua, this volume).

Although the level of scientific and technical capacity might vary at each site, almost all ICM programs in the region share the same challenge of lack of knowhow and practical experience in undertaking integrated management. Many past integrated coastal zone management and coastal resources management initiatives were initiated and implemented by external experts. Unfortunately, these projects were unable to build a critical mass of ICM expertise at the local level which was sustained after the projects ended (Chua and Scura, 1992). PEMSEA placed greater emphasis in mobilizing local officials, scientists and environment/resource managers to participate in the initiation, development and

implementation of ICM programs in their respective areas, while providing the needed ICM concept, framework and operating process as well as technical support from the regional program. An excellent example is presented in the case of Sihanoukville. As indicated in the case study by (Visal, et al., this volume): “ICM system helps building capacities and leadership competencies in local practitioners so that they became effective agents of change”.

Although the level of local capacity might vary, the successes of the ICM sites are testimonies that investment in capacity building is the right approach. The involvement of local scientific, educational, and research institutions and experts in Xiamen created a critical mass of interdisciplinary scientists to provide support to local authorities in addressing coastal problems while being exposed to the complexities of management challenges. Also developed was a critical mass of interagency officials with experience in working together, including the ability to mobilize scientific support, build partnership with stakeholders, and facilitate consensus building (Chua, 2006). In some ICM sites, provision for scientific advice is made possible either by incorporating an expert group as the technical arm of the coordinating mechanism, as in the case of Xiamen (PEMSEA, 2006d; Hong, this volume) or direct participation of representatives from educational and scientific research institutions as in the case of Chonburi, Batangas, and Da Nang.

Capacity building is a continuous process through learning by doing. The ICM cycle facilitates adaptive learning for governments, politicians, line agencies, and all stakeholders. A good example of the importance of this approach is the PEMSEA Network of Local Governments (PNLG). The PNLG was established by local governments of the region that are implementing ICM programs to share knowledge, experiences, and methodologies as well as to promote ICM practices to other coastal areas in the region. This has been one of the factors resulting in a growth of ICM sites from two to 60 since 1993 covering 12 countries (PEMSEA, 2017).

Another unique feature of ICM upscaling is the involvement of universities and research institutions, which over the years of participation, gained better knowledge of governance and management requirements and where and how scientific and technical support is best aligned. A regional network of ICM learning centers (i.e., PEMSEA Network of Learning Centers) composed of universities and research institutions was established by PEMSEA to facilitate ready access to scientific and technical support to national and local governments for scaling up ICM, as well as for sharing knowledge, experience, and skills across network members.

Geographical, functional, and temporal scaling up. Functional scaling up refers to when the capacity to address multiple coastal challenges is achieved. As their experience and confidence in ICM grew, national and local governments began to scale up ICM program coverage to include river basins and watershed areas in the cases of Xiamen (Rafael, [this volume](#)) and Lao PDR (Phantamala, et al., [this volume](#)); extend coastal use zoning across the entire coastline in the case of Selangor (Shamsuddin, [this volume](#)); or expand ICM initiatives to cover the neighboring coastal provinces as in the case of Cambodia (PEMSEA, 2015a, b).

An ICM system is valuable

Over the past 25 years, the ICM system has contributed to sustainable coastal and ocean development. Its value stems from its ability to create a major shift in procedures (and perceptions), which is integrative and collaborative in gambit and in the form of a partnership arrangement in ambit. It utilizes the integration of policy and administrative agenda with science and values; and across different levels of governance hierarchies, sectors, disciplines, key stakeholders, and communities.

An ICM system puts a premium on coordination of the different administrative functions of (and procedures in) local governments. Policy measures are reframed and better understood; administrative operations become more streamlined and efficient; and collaborative platforms with partners widen and expand the available action spaces for management interventions. As a result, choosing among ICM tools and monitoring their effects becomes collaborative, informed by science, and instructive. In turn, a well-crafted and appropriately communicated ICM governance framework contributes to integrating the different management approaches, such as ecosystem-based management, adaptive management, land-sea spatial planning, sector-based management, etc., in parallel with local development planning and implementation processes.

Policy and functional integration

Integration plays a central role in driving policy and coordination across sectors, agencies, space, disciplines, and levels of governance throughout the ICM system. Integration increases complementarities, streamlines sectoral policy and agency functions, and minimizes interagency and intersectoral conflicts. As evident in the case studies, many sites were able to achieve a fair level of policy and functional integration

during the course of ICM implementation. This resulted in reductions in interagency conflicts and duplication of functions and activities.

Coordination is the organizational dynamics which drives interagency and multisector collaboration; harmonizes functions and priorities; and minimizes and manages multiple use conflicts. For example, Xiamen City was able to reduce use conflicts in its coastal waters especially in the Western Channel through a strong coordinating mechanism and implementation of functional zoning schemes (Fang and Ma, this volume). The removal and transfer of thousands of fish cages and oyster rafts in congested navigational channels could not be achieved peacefully without the strong and effective coordination between law enforcers and fish farmers. Coordination cuts across all sectors and requires the understanding and cooperation of all, relying heavily on the dynamics of the coordinating mechanism to forge consensus, mobilize scientific support, earn political and social acceptance, and generate financial investments towards achieving the common vision (Chua, 2006).

The case studies indicate a moderate to strong degree of interagency and multisector coordination in addressing environmental, social, and economic issues made possible through high-level coordinating committees. An interagency committee normally comprises representatives from concerned government agencies and key stakeholders. The composition varies with the political system and understanding of the ICM concept. The committee is often chaired by the sitting governor (e.g., Batangas, Bataan) or mayor/executive vice-mayor (e.g., Da Nang, Xiamen, Dongying) or their representatives. Senior officials from each participating agency and key stakeholders serve as members. Many of the achievements of ICM programs can be attributed to the effectiveness of the coordinating mechanisms (Bermas and Chua, this volume).

A strong degree of policy and functional integration as well as intersector integration in implementing ICM programs is evident in all case studies. Vertical and horizontal integration is also facilitated especially at locations where there is national ocean policy, legislation, and/or executive orders such as those in PR China, Viet Nam, and the Philippines (PEMSEA, 2003a-c). In addition, spatial integration strengthened implementation of coastal zoning in Xiamen (PEMSEA, 2006a; Fang and Ma, this volume) and Port Klang (Shamsuddin, this volume).

Science-policy integration: a “post-normal” science

Science plays an important supportive role in coastal management particularly in providing the much needed scientific interpretations as input to policy and management decisions (Chua, 2006; Hong, this volume). A “post-normal” science has emerged over time in response to management challenges (Chua, 1997; Bremer, 2011; Cormier, et al., 2017). From a “disinterested,” for science-sake research to management-targeted research: “the role of scientific knowledge generated through research... [has now been reframed as a way]... to educate and inform the public and the political system as well as influence the agenda and priorities of a given government” (Cormier, et al., 2017). Hence, science, policy, and management integration have become an indispensable part of the ICM system, providing opportunities for scientific experts’ involvement at various levels and processes of program development. For example in Xiamen, scientists from Xiamen University and national and provincial oceanographic institutes provided the needed advice and analysis as members of either the Expert Group of the Coordinating Committee and/or field investigating teams to undertake local surveys and information gathering and interpretation (Hong, this volume). In Batangas, scientists from national universities such as the University of the Philippines provided scientific

support in developing the coastal strategy and action plans as well as conducting coral reef surveys (Esmas, et al., [this volume](#); Padura, et al., [this volume](#)). In addition, interdisciplinary scientific researches were undertaken to address coastal challenges of policy, social, and economic nature such as in risk assessments (MPP-EAS and FAO, 1999), coastal profiling (Chua, 2006), and coastal zoning (Fang and Ma, [this volume](#)).

Effective use of science and technology is essential to ensure that policy and management interventions are informed by science through expert advice from concerned disciplines. In assessing scientific and technological support for ICM program of Xiamen, (Hong, [this volume](#)) stated: “The effectiveness of scientific and technological support for coastal management is greatly enhanced through timely provision of critical and reliable information, techniques or technologies that can be utilized for policy and management interventions”. In the Xiamen ICM program, involving local scientific experts strengthened science-policy interface; facilitated a better understanding between scientists and managers; improved the effectiveness of scientific monitoring and analysis; and demonstrated impacts and benefits that accrued as a consequence of investments..

Integration into broader, larger “policy implementation arena”

The effectiveness of “inclusiveness” in coastal management especially in creating innovative partnership mechanisms to help implement management interventions and targeted research and investments has been well illustrated. The partnership arrangements started as a platform that encouraged relationship-building and created a bridge across previously disconnected actors in the public and private sectors. The result has been stakeholders’ buy-in and participation and collaboration across diverse interests and sectors.

Stakeholders’ buy-in and participation.

Consulting the relevant stakeholders such as coastal communities in securing their support and participation proved to be necessary to ensure smooth implementation of ICM.

ICM sites in Cambodia, Indonesia, Malaysia, Philippines, and Thailand adopted a multi-sectoral participatory approach in developing and implementing their programs. Those in PR China, DPR Korea, and Viet Nam involved various local authorities. They also consulted local communities on issues that concerned them. In Bataan and Batangas, key stakeholders were represented in the local coordination committee established by the government. In both sites, private corporations operating along the coast were heavily involved in the local ICM programs and were represented in the coordinating committees. The private corporations established foundations (such as the Batangas Bay Coastal Resource Foundation) to provide support for the implementation of some of the ICM program activities, such as mangrove planting, solid waste management, sustainable livelihoods, etc. (Chua, 2006). By participating in the ICM programs, the local enterprises were able to contribute more effectively to a common objective. The ICM programs practiced inclusiveness and a participatory approach, which contributed to the stakeholders’ buy-ins and collaboration.

Collaboration across diverse interests and sectors.

Partnership is a formidable driving force for change as no single sector or agency is able to effectively address the complex issues of coastal and marine areas. ICM promotes partnership development among agencies and sectors to collectively address coastal challenges as guided by a common vision and towards achieving set objectives. ICM programs in Batangas, Bataan, Chonburi, Xiamen, and Sihanoukville were able to build strong partnerships between local governments and private or business sectors, nongovernment agencies, research and

educational institutions, and local communities. In Chonburi, there was heavy involvement of academic and research institutions in the ICM development process because of their strong partnership with the local governments.

Across the different ICM programs, the process of engaging and convening stakeholders and

partners in a variety of ways and multiple times further validated the importance of partnerships in a bigger broader implementation arena (e.g., Jentoft, 2007; Verutes, et al., 2017): creating an empowered coalition of partners; multiple sourcing of contributed data; reviewing and refining ICM tools and scientific products that were incorporated in ICM plans; and re-imagining

Table 2. Contributions to Sustainable Development Goals (SDGs) within an ICM system: Linking sector driven initiatives to managing multiple ecosystem services.

SDG/ Sector and Ecosystem services	Opportunities and Solutions from the Case Studies
<p>SDG 13 (Climate Action)</p> <p>Disaster management</p>	<p>Xiamen has developed an effective severe typhoon response system which not only reduced fatality at sea and on land but also prevented the loss of fishing vessels and damage to properties on land. In addition, it has also established an oil spill response plan and response measures to toxic algal blooms and to keep the general public well informed (PEMSEA, 2006b).</p> <p>In Batangas, oil spill preparedness and response is well in place with the active participation of the oil industries operating in the port area (PEMSEA, 2006c).</p> <p>Guimaras, which had experienced a severe oil spill, took local initiatives to prepare its inhabitants with an early warning mechanism.</p> <p>In Dongying, where significant risks of oil spills from oil and gas exploration and production activities in the Bohai Sea could occur, the local government works closely with the national authority on contingency planning, strengthening of oil spill detection and monitoring capacity as well as developing appropriate institutional arrangements to ensure effective response implementation (Liu, this volume).</p>
<p>SDG 14 (Life below water)</p> <p>Habitat protection, restoration, and management</p>	<p>In Denpasar, Bali, significant success was reported in coral restoration and conservation in the Serangan Island largely through community initiatives and local champions (Sudiarta, this volume).</p> <p>The Bali experience was reinforced by the Chonburi ICM program where the private sector, in collaboration with scientific communities, contributed significantly to coral reef restoration in the Gulf of Thailand (Barnette, et al., this volume).</p> <p>In Xiamen, significant achievements in wetland conservation and mangrove restoration, protection and conservation of egrets and white dolphins, protection of endangered species, and beach habitats were reported (PEMSEA, 2006b).</p> <p>The case study on green turtle protection in Sukabumi demonstrated the effective mobilization of political support, to protect and conserve their natural heritage, and to preserve the symbol of the city (Gunawan, et al., this volume).</p> <p>As part of the initiative to promote ecotourism, several sites embarked on urban greening with significant success. Urban greening in Da Nang has brought about “additional environmental and economic benefits including cleaner air and water, more attractive properties and recreational areas, reduction of erosion, and other hazards associated with typhoons and severe storm events” (Dieu, et al., this volume).</p> <p>The successful experience in mobilizing local communities in Tabanan Regency of Bali in harmonizing religious and economic use of the Ganga Beach within the context of ICM approach enhanced cooperation between local community leaders and government in the sustainable management of the Yeh Ganga Beach (Sudiarta, this volume). It also demonstrated the effectiveness and viability of ICM approach at the community level.</p>

<p>SDG 14 (Life below water)</p> <p>Food security and livelihood management</p>	<p>Dongying placed greater focus on protecting and sustaining the ecological functions of inshore fishing grounds (Fu and Zhang, this volume) and on transforming the unsustainable shrimp farms into ecologically based and technologically viable aquaculture industry (Yi, this volume).</p> <p>In Chonburi, local fishers were encouraged to gather gravid crabs and hold them in cages until the eggs hatched, thus increasing the crab population in nursery ground (Wiwekwin and Barnette, this volume).</p>
<p>SDG 6 (Clean water and sanitation)</p> <p>Water use and supply management</p>	<p>Effective management of freshwater resources from estuaries, rivers, streams, and watersheds and often across administrative boundaries requires "close cooperation and collaboration of concerned local governments and their line agencies, and also the support of academic and scientific institutions to provide needed scientific data and water quality monitoring information for appropriate public investments and intervention" (Chen and Hong, this volume).</p> <p>The success of Singapore in ensuring drinking water for its vast population and innovative water resource management experience is a learning model (Chou, this volume).</p>
<p>SDG 6 (Clean water and sanitation)</p> <p>Pollution reduction and waste management</p>	<p>In Lao PDR and Cambodia, innovative approaches were developed by promoting community-led solid waste management programs, participated in by government and private sector, that provide facilities and impose a user fee system aimed at self-sustainability.</p> <p>Managing discharges from land such as sewage and industrial wastes into coastal seas is another complex management issue requiring strong political will, policy and legislative measures, and support and cooperation from the public and industries.</p> <p>All ICM sites have incorporated land discharge as a priority issue. However, the cost of setting up sewage treatment facilities requires enormous financial resources which most local governments could not afford unless support from central government and loans from multilateral banking institutions are available. Some ICM sites, such as Xiamen, Dongying, Da Nang, Chonburi, and Sihanoukville, were able to make significant progress towards this direction.</p> <p>Of equal significance are oil spills from ships and offshore oil exploration and exploitation facilities. Appropriate oil spill preparedness and response facilities were in place to combat potential spills in the Bohai Sea and Dongying coastline (Liu, this volume).</p> <p>Batangas is well equipped with Tier-2 oil spill response facilities by the oil industry located along its coast (PEMSEA, 2006c) while Guimaras only managed to establish its oil spill response protocol after suffering from severe oil spill impacts.</p>
<p>SDG 17 (Partnerships for the goals)</p>	<p>In Xiamen, scientists from Xiamen University and national and provincial oceanographic institutes provided the needed advice and analysis as members of either the Expert Group of the Coordinating Committee or of the field investigating teams to undertake local surveys and information gathering and interpretation (Hong, this volume).</p> <p>In Batangas, scientists from the University of the Philippines, provided scientific support in developing its coastal strategy and action plans as well as in conducting coral reef surveys (Esmas, et al., this volume; Padura, et al., this volume).</p> <p>Interdisciplinary scientific researches were often undertaken to address coastal challenges of policy, social, and economic nature such as in risk assessments (MPP-EAS and FAO, 1999), coastal profiling (Chua, 2006); and coastal zoning (Fang and Ma, this volume).</p>
<p>SDG 11 (Sustainable Cities and Communities)</p>	<p>In 2009, Singapore adopted an integrated urban coastal management (IUCM) as a more efficient way to use the whole resources of the island nation to achieve the goal of sustainable development (Chou, this volume).</p> <p>The scaling up of ICM in Selangor, Malaysia (Shamsuddin, this volume), Preah Sihanouk, Cambodia (Visal, et al., this volume) and in Chonburi, Thailand (Barnette and Wiwekwin, this volume) was supported by national legislative measures and continuous capacity building.</p>

and codeveloping future developmental and environmental scenarios and reframing problems as solutions.

Within an ICM system, various sectoral approaches became operational

Another value of an ICM system is that it enables various approaches in coastal management like ecosystem-based management, climate change adaptation, disaster risk reduction, biodiversity conservation, etc., to “piggy back” into its domain. In a way, it fast tracks the prescribed planning and implementation phases of these various approaches (and their need to integrate and cross learn from various other sectors and disciplines). Studies by experts (e.g., Runhaar, 2015; Uittenbroek, 2016; Uittenbroek, et al., 2013, 2014) articulate a pragmatic mechanism in “mainstreaming” new sector policies within existing comprehensive policy domains. Other experts (e.g., Cormier, et al., 2017) contend that the science to operationally implement an ecosystem-based management is currently sufficient. What is most needed is for ecosystem-based management to closely operate within the policy/administrative cycles of governments.

Several coastal management approaches need not start with a blank slate nor organically mature over a longer time. Instead, they can use institutionalized tools and administrative procedures; legal and communication platforms; and partner networks, already established in ICM programs. As such, functional ICM systems have become the initial starting blocks. As demonstrated in the case studies, ICM systems are being used as leverage to starting and/or sustaining the implementation of different sector initiatives. Table 2 further lists these initiatives.

Managing multiple ecosystem services has been enabled through spatial planning, which has become an inherent governance tool of an ICM system. Xiamen (PR China), Da Nang (Viet Nam), Bataan (Philippines), Selangor (Malaysia),

and Preah Sihanouk (Cambodia), have further elevated the value of spatial planning when they implemented their explicitly elucidated, visually mapped — and collectively agreed upon — coastal use zoning plans in their jurisdictions. Monitoring the changes in ecological responses (and/or human behavior) brought about by the interventions (and regulations) became easier and were properly communicated. Appropriate or immediate responses were made, if the need arose. The case studies show coastal use zoning to be effective in reducing multiple use conflicts, enhancing ecosystem health, helping in food security, and reducing the impacts of disasters.

The case of Xiamen is exemplary. On the inception of the ICM project, the environmental profiling of Xiamen showed that the inshore water was overfished and overcrowded with unregulated floating fish cages and oyster rafts spreading across major navigational channels (PEMSEA, 2006b). In the course of the project, the local government decided to relocate aquaculture to designated areas and to remove fish cages and rafts from congested navigational channels in line with the common vision of the city to develop as a progressive modern sea port and garden city as well as with the approved marine functional zoning scheme (Fang and Ma, this volume). Over 5,000 households were eventually removed or relocated and the navigational channels were finally cleared and free for shipping (PEMSEA, 2006b) with the agreement of and necessary rehabilitation programs for the affected fish farming community.

An ICM system has been providing a unified operational framework for governance and management of delimited coastal areas. As the ICM system matures, it draws lessons which validate the value of different coastal management approaches. Several snapshots of distilled lessons from the case studies serve as demonstrations:

- In social psychology and behavior management: The case studies in Lao PDR

and Cambodia concluded that “effective solid waste management among unserved, poor communities involves changing the behavior and practices of households including strengthening their environmental awareness, role, and responsibility in the provision of a safe and healthy environment” (Inthachack, et al., this volume).

- In natural resource management: In Batangas, concerned local authorities were able to work in partnership with the private sector, nongovernment agencies, and local communities to restore the much degraded mangroves (PEMSEA, 2006c) and to protect and effectively manage the remaining coral reefs through the network of marine protected areas especially in the Verde Island Passage (Sollestre, et al., this volume).
- In bioeconomics/ecological economics/poverty alleviation: (Peng, this volume) rightly remarked, “In coastal area management practices, the cost bearers and beneficiaries of a policy or program might belong to different sectors of the population. Therefore, in policy development, special attention needs to be made to those sectors experiencing net costs or negative impacts.”
- In leadership development: “The ICM system helps to build capacities and can develop technical and leadership competencies in local practitioners so that they can become effective agents of change” (Visal, et al., this volume).

An ICM system can also serve as a platform to test innovations in ecological restoration and climate change adaptation. In a span of 25 years, Xiamen has effectively treated all its domestic wastewater and eliminated the discharge of untreated sewage into its coastal waters. Industrial discharges were greatly reduced through strong legislative measures or the removal of polluting industries from the city (PEMSEA, 2006b). The

environmental quality of Xiamen’s bays and nearby lagoons was restored. A notable example is the restoration of the Yuandang Lagoon, which was once a heavily polluted water body in the heart of the city (PEMSEA, 2006b). The restoration was enabled by policy, legislative, and technological measures and strong public support. There are other particular environmental management concerns, such as climate change adaptation as illustrated in Da Nang (Chin, et al., this volume), addressed in an ICM system (Table 2). The above management concerns generally reflect environmental challenges of coastal sites in the region.

An ICM system is validating

The case studies have validated the role the ICM system thus far; that it has “disrupted” the usual sectoral way of doing things. In monitoring, evaluating, and reporting of ICM performance (see Box 4), visible outcomes cannot be disputed. In addition, the contributions of ICM systems in strengthening and streamlining policy, legislation, and institutional functions were leveraged in the enactment of national ocean policy, strategies, and administrative orders. The ICM system has been demonstrated to be working in land-locked state such as Lao PDR. Singapore and Japan, which have long-been efficient in a sectoral way of managing coasts, re-imagined an integrative approach through ICM systems. Singapore, reframed ICM in the context of highly urbanized settings encumbered by increasing threats of climate changes and loss in biodiversity. Cities in Japan underscored the complementariness of age-old tradition and ICM (PEMSEA, 2015a). International conventions and agreements continue to benefit from the implementation of ICM systems in countries that are also Parties to those international instruments.

Visible outcomes. The demonstration sites were able to generate visible outcomes necessary to

Box 4. Monitoring, evaluating, and reporting of ICM performance.

The setting up of this component in the ICM system was to ensure regular monitoring of progress and achievements or problems encountered during the process of ICM program development and implementation and to make regular reporting to Program Management and the general public – steps which were often neglected or rendered inadequate in past coastal management initiatives (Chua, 2008). Monitoring of progress must be carefully assessed against the workplan while outcomes must be evaluated against predetermined performance indicators. PEMSEA developed a standard coastal reporting format known as State of the Coast (SOC) Report (PEMSEA, 2011). The SOC report is intended to provide a comprehensive documentation of the planned and executed management actions of an ICM program. It enhances accountability in environmental governance through systematic and comprehensive monitoring of social and ecological outcomes (Padayao, this volume). The key performance indicators are based primarily on relevant indicators for measuring the performances of international and regional targets and commitments. The SOC report primarily tracks changes related to social, economic, and environmental conditions against management actions over a defined management boundary.

Batangas and Guimaras have prepared and used SOC reports as documented evidence of the value and impacts of holistic and integrated planning and management approach to address their coastal challenges. Hence, SOC reports helped to justify financial and human resource investments and the continuation of their ICM programs (Provincial Government of Batangas and PEMSEA, 2008; Provincial Government of Guimaras and PEMSEA, 2012). The usefulness of SOC was also recognized by the national governments. Ten national governments (Cambodia, China, Indonesia, Malaysia, Philippines, RO Korea, Singapore, Thailand, Timor-Leste and Viet Nam) are currently preparing national SOC reports.

Despite the usefulness of SOC reports, several ICM sites have demonstrated weaknesses in continuing with this endeavor. First, preparation of SOC requires time for monitoring changes; financial and human resources to strengthen evaluation and quality of information; and patience to follow the ICM cyclical process. Changes in leadership and priority of local government tend to influence the continuity and quality of the SOC report. Second, SOC is a new reporting format and has yet to be accepted internationally for universal application. Therefore, ICM initiators need to consider these in designing and executing their programs.

strengthen political and social acceptance of the ICM program and cooperation and collaboration of the integrated approach from line agencies and sectors. The types, levels, and timing of outcomes varied with the implementation in each site.

Almost all sites were able to generate the following outputs/outcome: (a) a coastal

profile and risk analysis which identify coastal challenges and opportunities; (b) a shared/common vision adopted through stakeholders' consultation process; (c) a coastal strategy to provide strategic action plans in achieving immediate and long-term objectives; (d) a coordinating mechanism; and (e) an approved ICM program.

Some demonstration sites were able to produce visible physical outcomes in terms of habitat protection and restoration (e.g., Batangas, Bataan, and Xiamen); solid waste management (e.g., Xiamen, Dongying, Da Nang, and Sihanoukville); halting sand mining in beaches (e.g., Xiamen); cleaning up of Yuandang Lagoon (Xiamen); and coastal zoning (e.g., Xiamen, Bataan, Da Nang, Dongying, Port Klang, and Sihanoukville), etc. Visible outcomes are necessary not only to demonstrate the value and effectiveness of the ICM program but also the confidence it created among stakeholders and governments.

Catalyzed national policy, legislation, and institutional reform. Several ICM demonstration sites made significant contributions to national efforts towards sustainable use of goods and services from coasts and oceans, which led to institutional reforms in several countries like Korea, Viet Nam, Japan, and China (Bernad and Chua, 2015). These changes were lacking in most countries during the 1990s when the demonstration sites were initiated. For example, the successful implementation of the functional zoning scheme in Xiamen led to the enactment of Sea Space Utilization Law of the People's Republic of China (1997) and the inclusion of integrated management approach in the 12th national plan of the country (PEMSEA, 2003b).

The achievements in Batangas and Bataan sites led to Presidential Decree 533 to promote ICM practices throughout the country. Similarly, the achievements in Da Nang demonstration site led to the Prime Minister's Decree to promote ICM practices in 14 provinces of Viet Nam as well as the ultimate institutional reform, the establishment of an ICM coordinating agency under the newly established Ministry of Natural Resources and the Environment. A few years later, the national ocean policy of Viet Nam was enacted followed by the establishment of the Viet Nam Administration of Seas and Islands (PEMSEA, 2012a). In Cambodia, the government established

an integrated Ministerial Committee, which played a strong role in the scaling up of ICM to cover the entire coastline based on the success and experience of the Sihanoukville ICM program implementation; marking the first country in the region to achieve 100% ICM coverage (PEMSEA, 2012b). In Indonesia, the Ministry of Marine Affairs and Fisheries was established to oversee the development and management of coastal and marine resources. New legislation was enacted to decentralize resource management to local governments (Bernad and Chua, 2015) after due experience drawn from past coastal management practices including that of the Bali ICM site. The demonstration and parallel sites therefore played an indispensable catalytic role.

Consequently, PEMSEA established a framework for national coastal and marine policy development to facilitate efforts in formulating policies as part of the regional marine strategy for sustainable development. As of 2015, 10 of the 12 countries have developed coastal and marine policies, strategies, action plans and programs on coastal, ocean, and river-basin management (PEMSEA, 2015a, b).

Validation through certification. The systematic and process-oriented governance and management approach in addressing coastal environmental management challenges are fully in compliance with international standards of governance and environmental management especially the ISO 9001 and ISO 14000 requirements. Thus, full execution of the ICM programs enables the local governments to be certified as conforming to international standards of practice (Chua, 2008). PEMSEA has earlier experienced promoting the use of ISO certification in ensuring port safety, health of workers and environmental quality through a port safety, health, and environment management system (Cardinal and Factuar, this volume).

In order to encourage local governments to follow a standard process on coastal management practices,

PEMSEA developed a set of guidelines or ICM Code that is aligned with international standards for governance and environmental management (PEMSEA, 2015a). Local governments desiring to have an objective third party assessment of their ICM programs may be certified against international standards, as conforming to the ICM Code. Local governments who have completed the first phase of ICM - including establishment of the coordinating mechanism, and implementation of a vision-led coastal strategy and environmental management action programs - can be awarded the first level of ICM certification. There are two other levels of certification, one focused on management, and one on sustainability. The ICM Code can improve their ICM programs by ensuring full and effective integration of all essential components of the ICM system; gain local, national, and international recognition; strengthen confidence in the implementation of the ICM system; and create a favorable sustainable environment for economic investments.

Fifteen local governments have secured the first level of ICM certification (PEMSEA, 2015a; Cardinal, et. al., this volume). A major indicator of change in this stage is the move from sector-based to integrated planning and management in addressing coastal and marine challenges. The PEMSEA Network of Local Governments has committed to seeking ICM certification for 100% of its members.

Applications. An ICM system has been made as a template in the land-locked state of Lao PDR; in particular, providing the needed working modality for an integrated river basin management (IRBM). The implementation of the river basin and sub-basin management in Houay Champi has made full use of the ICM concept and working modality. Phantamala, et al., (this volume) concluded that IRBM and ICM are complementary and mutually reinforcing in natural resources management across a wider landscape from river to coast.

The ICM approach was also adopted in developed countries like Singapore and Japan. In evaluating the implementation of integrated urban coastal management (IUCM) in Singapore, Chou (this volume) concluded that “the ICM system remains fully relevant to a highly urbanized city that has all along been developed through sectoral management”. Realizing the usefulness and effectiveness of integrated management, several local governments in Japan including Shima City, Obama City, Bizan City, and Miyako City have initiated an integrative, comprehensive management approach with measurable success (PEMSEA, 2015a).

The main purpose of an ICM system is to realize environmental, social, and economic sustainability in the coastal and marine areas. Many local governments implementing ICM programs are addressing prioritized sustainable development challenges such as disaster risk reduction and management, biodiversity loss, pollution, access to and security of freshwater supplies, and sustainable use of marine resources. As such, these local governments are directly contributing to SDGs such as clean water and sanitation (SDG 6), sustainable cities (SDG 11), climate actions (SDG 13), life on land and below water (SDG 14, 15), and partnerships (SDG 17) as indicated in Table 2. The ICM system can also catalyze other relevant sustainable development targets which are critical in a local government context, including reduction of poverty and hunger (SDG 1, 2), gender equality (SDG 5), sustained, inclusive and sustainable economic growth (SDG 8), healthy lives and well being at all ages (SDG 3), and inclusive and equitable quality education (SDG 4)

The ICM system is also applicable in achieving global targets of international conventions and protocols. For example, the inclusion of “habitat protection, restoration, and management” in the common framework for Sustainable Development of Coastal Area (Figure 1; Chua, 2008) enables local action in addressing some of the concerns of

biodiversity conventions particularly in achieving the Aichi Biodiversity Targets (ABTs). The application of ICM system to achieve most of the 13 ABTs was outlined in the “Practical Guidance on Implementing Integrated Coastal Management in the Context of Achieving Aichi Biodiversity Targets” (CBD, 2015). Similarly, the inclusion of “pollution reduction and waste management” enables local ICM initiatives to implement the provisions of UNEP’s Convention on Global Actions for Land-based Pollution (GPA). The inclusion of “food security and livelihood management” contributes to addressing FAO’s Convention on Responsible Fisheries and the inclusion of “disaster management”, to meeting commitments of climate change convention.

In October 2017, a Resolution on Promoting Marine Protected Area Networks in the ASEAN Region was approved at the 12th Meeting of the Conference of Parties (COP) for the Convention on Migratory Species. The COP resolution specifically refers to ICM, the SDS-SEA (PEMSEA, 2003d) and PEMSEA, and encourages the implementation of National Biodiversity Strategies and Action Plans “...through the application of ICM as a process-oriented, holistic, science and ecosystem-based management system and driver for strengthening public and private sector commitments and investments in biodiversity conservation...” (UNEP/CMS, 2017). Other regional groups were identified in the Resolution as well, but it is apparent that PEMSEA was the only organization mentioned that actually operationalizes ICM on the ground.

Riding the next wave: Leveraging the ICM system to current challenges and opportunities.

ICM has been operating under various social-political conditions, be they democratic (Cambodia, Philippines, Thailand, Malaysia) or centralized (PR China, DPR Korea, Viet Nam), as well as different economic conditions, i.e., in

developing countries (Timor-Leste, Cambodia) and developed countries (Singapore, RO Korea, Japan). It was apparent that the local governments in countries with centralized governments (Xiamen, Dongying, Da Nang) can mobilize people and other resources quickly. They are able to make significant progress once the concept and operational methodology is accepted by the governments. On the other hand, decisionmaking and endorsement of new policy and financial support for ICM programs in countries with democratic systems (Batangas, Bataan, Guimaras, Chonburi, Sihanoukville) need more time and resources to gain political and social acceptance and to overcome periodic changes of government and leadership.

Based on the case studies presented, the coastal area is just the starting point; the groundwork to scale up across space, time and issues has been made. Operationally, an ICM system enhances the quality and legitimacy of policymaking and decisionmaking. The case studies demonstrate that an efficient and effective ICM program depended largely on the institutional capacity of the local government to lead, develop, and implement its strategy and action plan. The cumulative value of adaptive learning is evident throughout the process of ICM implementation in building up a critical mass of local personnel with management capability and hands-on experience. A new set of skills, competencies, and values was ingrained. These are ingredients for better managers and leaders.

As each ICM program of local governments has its unique attributes and strengths, cross-learning among ICM practitioners and managers through site visits, networking, and periodic ICM seminars are valuable tools for transfer of knowledge, exchange of experiences, and forging of intersite collaboration. Over time, with competencies and knowledge built, the level of political and social commitment to provide mechanisms for sustainable financing and further competency

building enable local governments to sustain their program of actions.

The biggest operational challenge though, is the ability of the local government and the concerned management authorities to continue embracing the concept of integrated management and maintaining political acceptance for their long-term vision. This emphasizes the importance of strict adherence to the stages of the ICM cycle and to the processes which enable appropriate responses to changing priorities and leadership.

Conceptually, amid uncertainty and complexities, the widest latitude to innovation in management systems, is where the contribution of ICM system can be found. The information base is enormous and knowledge continue to grow on several fronts: how ecosystem services are used, valued, and ways for protection and rehabilitation; the nexus of water, energy, and consumption patterns and links to disaster risk reduction; the development of sustainability leaders; and even for higher aspirations regarding hunger and poverty alleviation, gender equality, health, and education. The next wave of innovations is wide open:

- Managing large amounts of information, transforming information to knowledge products, and using knowledge products in planning processes of local governments, which opens up new windows of opportunity for targeted research and financial investments;
- New knowledge imposes a creation of a different “breed” of coastal leaders focused on “sustainability”;
- As partnership arrangements continue to accommodate new knowledge vis-à-vis differing worldviews and values, the networks are bound to be disrupted;

- The social digital ecosystem platforms offer immense power to manage change, if used appropriately;
- “Legal pluralism”, among other barriers, may need to be closely negotiated in approaches that link integrated river basin management with ICM, and in other scaling up initiatives;
- The stakeholder support is increasingly being underpinned by a need to resolve issues about social equity, of ways to equitably distribute power, and better use empowerment to alleviate poverty; and
- To become stronger and resilient, new forms of economies, such as a Blue Economy, are being promoted for smarter integration of biodiversity protection and management with diverse and ever-changing political, social, and economic needs.

To sustain innovation and to further enhance the capabilities expected of an ICM system, the SDS-SEA Implementation Plan (2018–2022) further strengthens PEMSEA’s commitment and approach to addressing the SDGs through ICM upscaling. The SDGs are today’s commitment for the future we want. Thus, SDGs represent a continuous international collective commitment that has been anchored in lessons of the past and are recognized as a common roadmap for all countries to sustainable development.

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“Based on the case studies presented, the coastal area is just the starting point; the groundwork to scale up across space, time, and issues has been made. Operationally, an ICM system enhances the quality and legitimacy of policymaking and decisionmaking. The case studies demonstrate that an efficient and effective ICM program depended largely on the institutional capacity of the local government to lead, develop, and implement its [coastal] strategy and action plans.”

Chua Thia-Eng and Danilo Bonga, Part IV

“The ICM system can be applied to river basins in land-locked countries such as Lao PDR. Like ICM, integrated river basin management (IRBM) can be adopted at the local level to address the practical needs of the villages in sub-basin areas, within the confines of available management capacities, both human and financial.”

Singthong Phantamala, Sengsoulivanh Inthachack, Keodokmai Phuipaseut, and Belyn Rafael, Case Study 28

“The lack of capacity in integrated planning and implementation is a challenge in developing countries. At the start-up of ICM programs, external assistance in building local capacity has proven to be effective. Over the longer term, capacity building is an integral part of ICM sustainability.”

Cristine Ingrid S. Narcise, Case Study 34

“The “ecological red-line” policy can be an effective tool for biodiversity conservation in conjunction with zoning permit fees and a “zoning pay-back” scheme. These are innovative financing options that can be used to support marine protected areas (MPA) management and operation.”

Zhang Zhaohui, Case Study 27

“Maintaining an environment laboratory [by a local government] to support a monitoring program is costly but can eventually be sustained by stakeholders that require such services, particularly when the laboratory attains accreditation. It also increases local capacity, which can help in ICM scaling up and replication.”

Marivic P. Esmas, Beverly F. Balahibo, and Luis A. Awitan, Case Study 19

“In securing continuous freshwater supply to meet growing population demand, scientists in Xiamen collectively demonstrated their indispensable role in water resource management decisions.”

Nengwan Chen and Huasheng Hong, Case Study 29

“Coordination is an indispensable element of an ICM program. The setting up of a Project Coordinating Committee by a responsible authority creates a favourable environment for ICM implementation and is crucial to ICM success.”

Pham Thi Chin, Phan Thi Thu Thuy, Truong Cong Hai, and Nguyen Minh Son, Case Study 3

“The Gangga Beach program demonstrates an effective, community-based ICM working modality.”

I Ketut Sudiarta, Case Study 25

“Marine and coastal conservation is not the sole responsibility of, nor should it be initiated only by, the government. The private sector, in collaboration with scientific research partners, can contribute significantly and, if properly facilitated, can attract more partners and volunteers.”

Praparsiri Barnette, Sakhon Pokhum, and Vitaya Khunplome, Case Study 23

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